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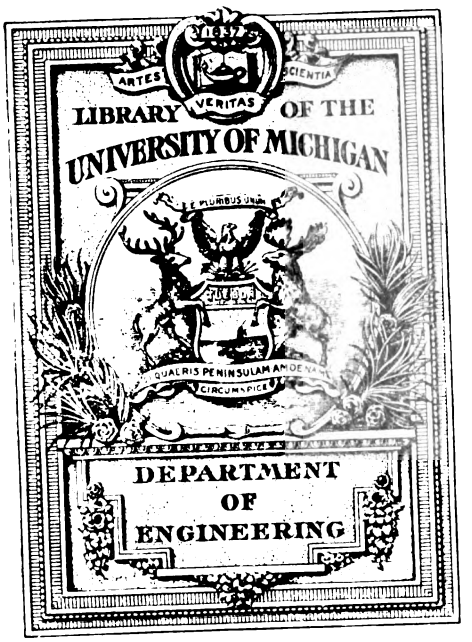

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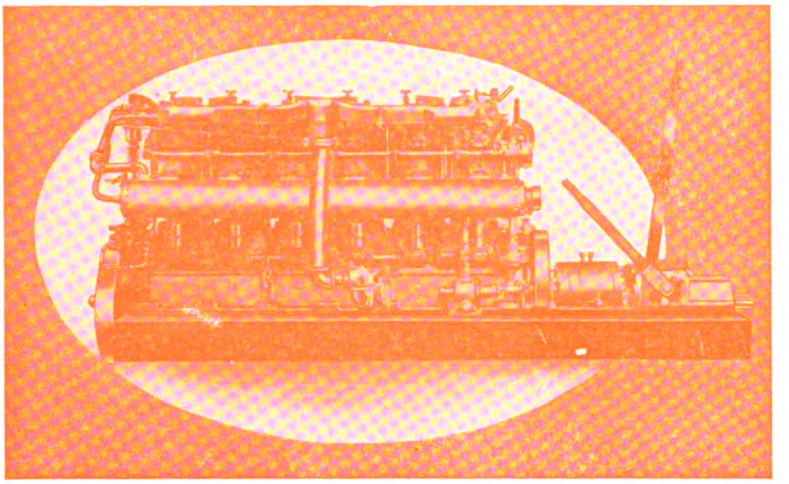

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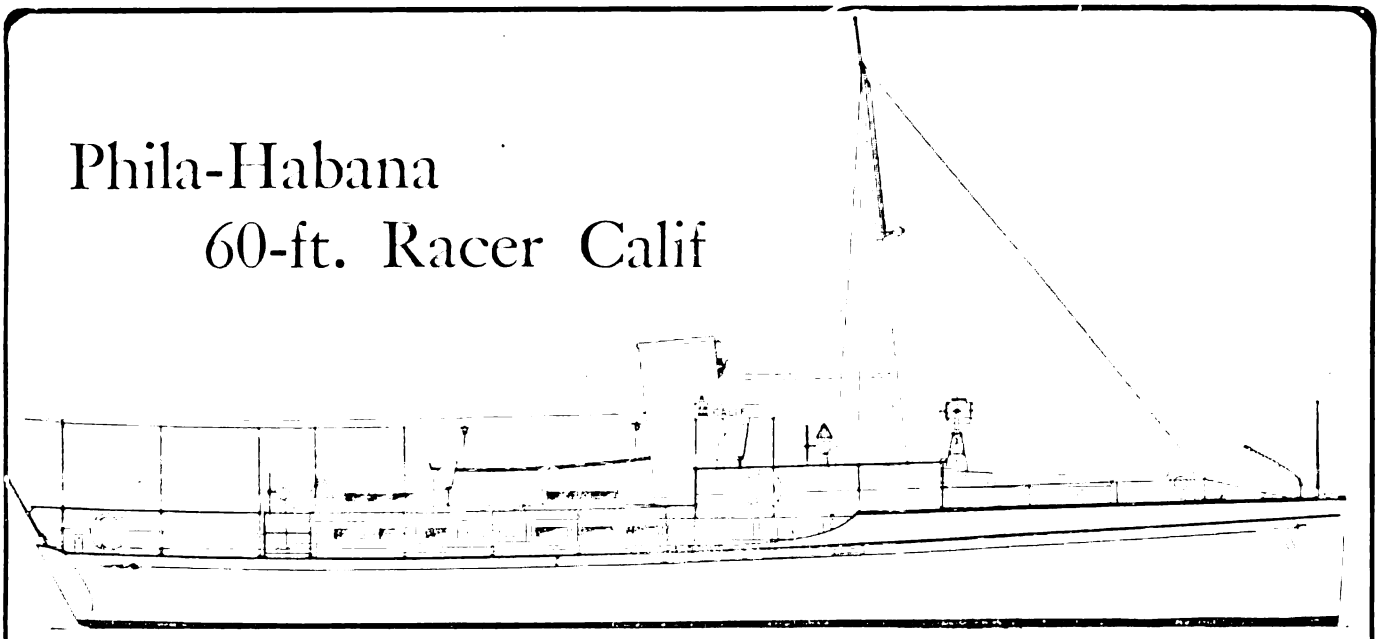

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[JULY TO DECEMBER, 1910]

THE RUDDER

EDITED BY

THOMAS FLEMING DAY

The Ocean with its vastness, its blue green,
Its ships, its rocks, its caves, its hopes, its fears,—
Its voice mysterious, which whoso hears
Must think on what will be and what has been.

—KEATS.

VOLUME XXIV

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"What's Your Longitude?"

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The Rudder

Edited by THOMAS FLEMING DAY

Vol. XXIV JULY, 1910 No. 1

THE HABANA RACE

THE Philadelphia-Habana Race is a matter of history and will go down in the chronicles as one of the most successful of contests. It is unique in the fact that it was the longest power-boat race run, that it was the first ocean race started from Philadelphia, and the first having for its destination a port in the West Indies. The prizes were also the largest ever given. The fact that the City Governments of Philadelphia and Habana officially recognized the race is also novel. The lessons taught by the race are many, but mostly a continuation of what was learned racing to Bermuda. First, that these boats are entirely seaworthy; that the engines are reliable; that fuel can be carried for a long voyage; that the system of handicapping under the present rule is not satisfactory, and that it is no use attempting these races to win with small power. With equipollent craft, a race of this kind might be fairly handicapped by using a measurement formula, but where boats differ largely in power and size the only fair way is to ascertain their actual speed and base the allowance upon that.

* * *

The getting up of the race was ably handled by the Yachtsmen's Club, and it was well managed from start to finish. No other race that I have had to do with was so well looked after, and the officers of the Yachtsmen's Club, especially the President, Treasurer and Secretary, deserve praise for their constant and efficient services. The action of the City of Philadelphia, through its Mayor and Council, also deserve the thanks of yachtsmen. It was not only an unusual, but a very liberal assistance that it gave. The cup was a beauty; in fact, I think the finest trophy we have had. The City of Habana also aided the race. The Alcalde and Council presented each participant with a medal; those for yachtsmen being silver and for the paid-hands copper. This was accompanied by a certificate signed by the Mayor. This recognition of the race by the civic governing bodies is the first, outside of Boston, that I have heard of, and it is hoped it will in the future lead to more.

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The committee at the start handled things in good shape and made their measurements promptly, so that we had the rating the evening before the start. That the measurement rule failed, as usual, to provide an equable handicap was no fault of theirs. I wanted, when we made the conditions, to handicap the boats on their actual performance, which is the only sensible and proper plan, but the proposition raised an immediate protest from the designers and other parties and it was washed under. Why men should insist to sticking to a nonsensical system when they can see that it does not do what it was intended to do beats me. For instance, everybody will admit that Ilys is a faster boat than Caroline, and yet the latter had to allow Ilys time. In good weather Ilys, when her engine was running properly, could beat Caroline a half knot and in any weather she could hold her. Caliph is a ten-knot boat, and she should have allowed Ilys and Caroline twenty hours instead of twelve. To say that you cannot ascertain the speed of a boat so as to fairly estimate a handicap is nonsense. To-day any man who is familiar with these boats knows the maximum speed of the different makes of engines and by looking at a hull can tell about what speed it will make. Unless something is done you will get no slow boats into these races, as under the present system they have as much chance of winning as a wax-legged dog has of enjoying a perambulation through the alleys of Hades.

* * *

If another of the long races is held, it should be embodied in the conditions and made imperative that all boats entering be equipped with electric lights. Not some little storage battery outfit, but a proper generating plant of sufficient capacity to efficiently light the boat. This generator should be run by a separate engine, which could also attend to the bilge pump and fan if necessary. The use of funnels has to an extent solved the problem of ventilation; in the engine room equipped with these devices there was reasonable comfort even in the hottest weather. The life-saving equipment was better this time. Caroline and Ilys had

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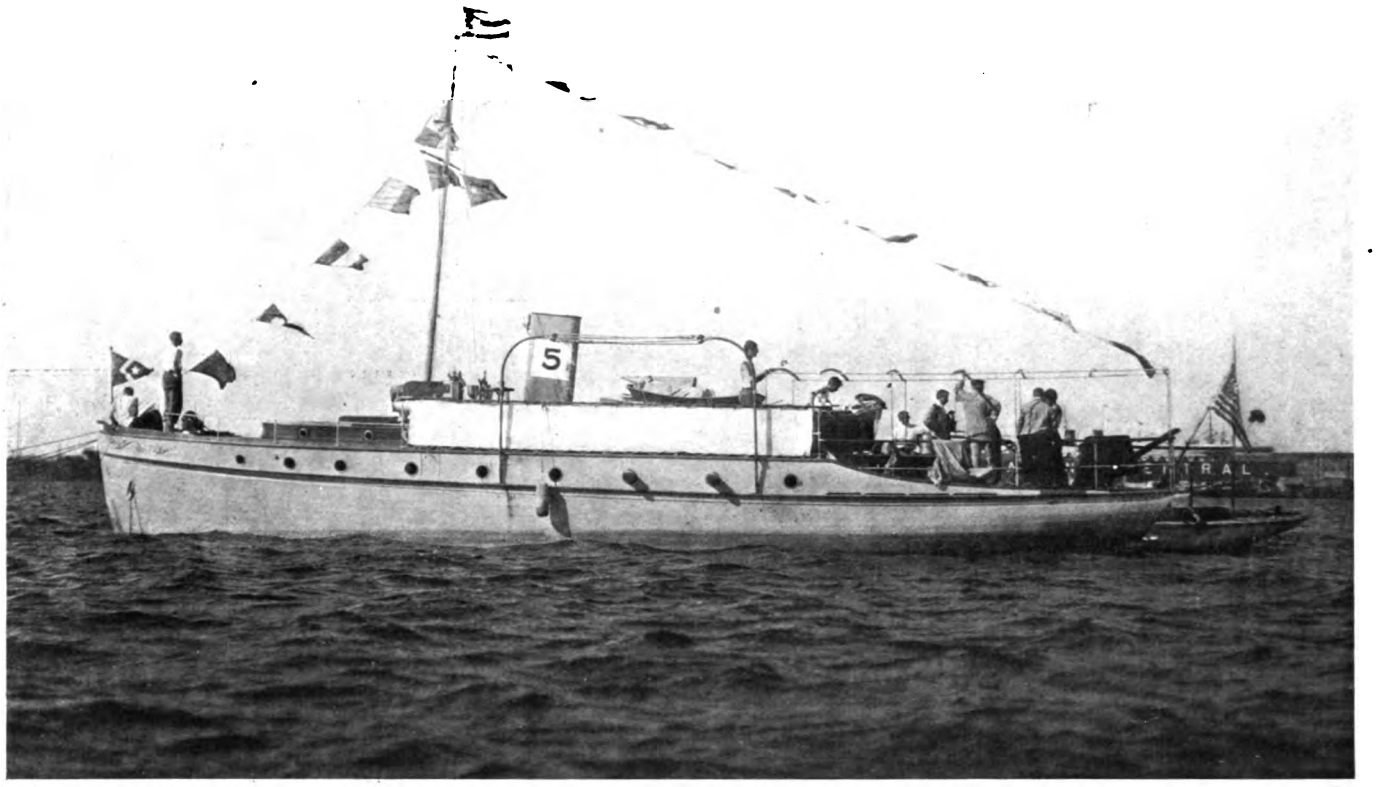
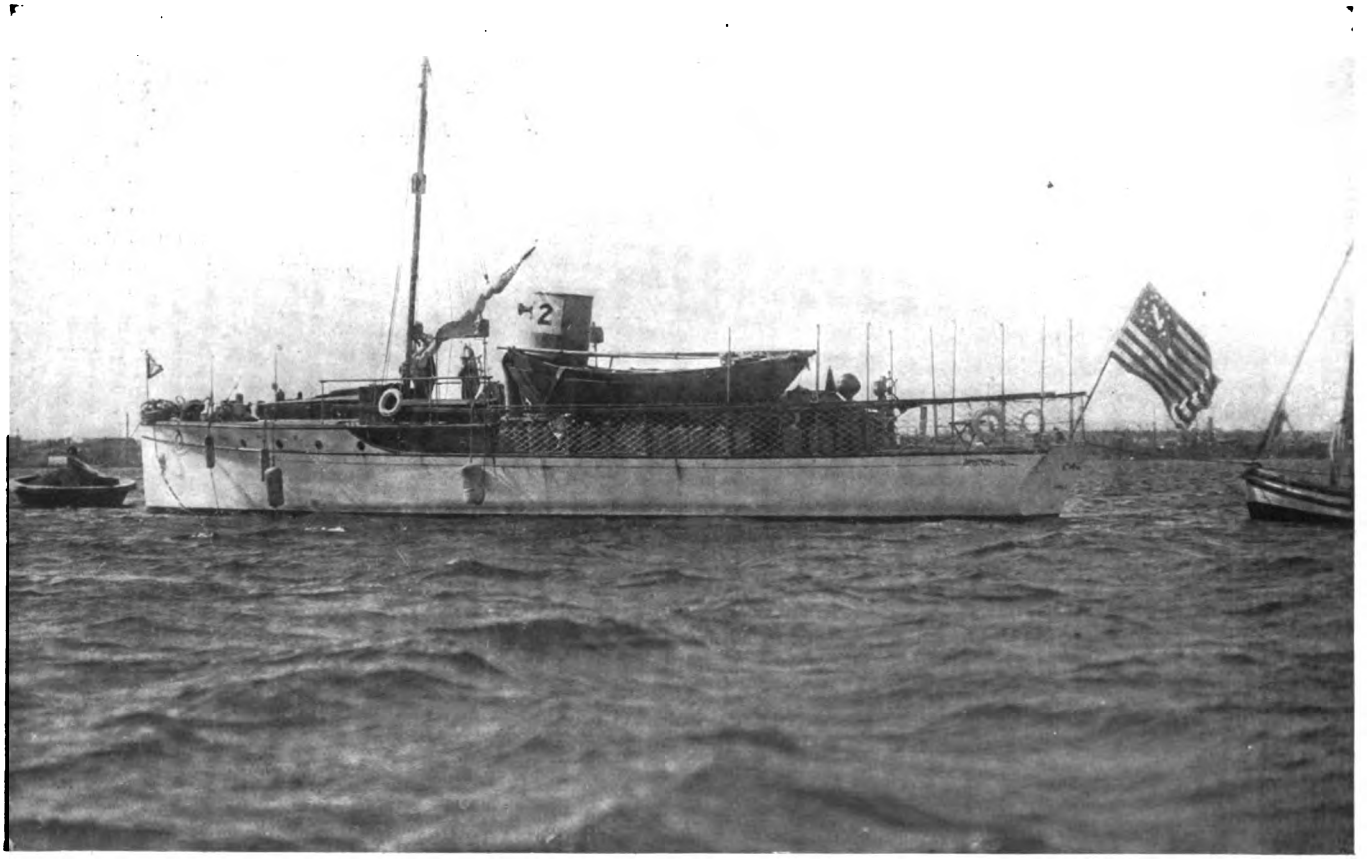


Berneyo, Owned by S. W. Granbery, Newark, N. J., Winner of the Habana Race and Second in the Race Home



Caliph, Owned by M. E. Brigham, Ventnor N. J. Winner of the Race Home and Second in the Habana Race

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two large dories, easily big enough to save the crew, and these were completely fitted out with oars, water-breakers and other things. Berneyo's boats were poor and the crew would have had to do some scrambling to make shore in them. I did not see Caliph's boats, but understand she had two good ones. This is something that should be seen to and no racer allowed to start without two good boats. I know they are a nuisance and catch plenty of wind, but if anything happened what would a good boat be worth to you?

* * *

Some of the New York papers paid little or no attention to the race until a report was brought into Boston by a steamer that one of the boats had been seen burning distress signals. This was the chance, and soon extras were out with flaming headlines, announcing a boat was lost. As Caroline was the unreported one, she was selected as the victim and pictures exhibited showing her in the act of sinking in a blaze of red fire and rockets. When the papers printed this they knew it was untrue; in fact, one paper was issued after the safe arrival of all four boats at Habana had been reported. It frightened a lot of ignorant people, but as we had said we would not be in Habana until Saturday, those who knew, paid no attention to these hysterics. It just shows how much regard newspapers have for a race of this kind from a sporting standpoint.

* * *

The Habana papers, especially La Lucha and Post, had very accurate stories of the race, and this is the more remarkable as it was the first time they had been called upon to report an event of the kind. The Spanish papers also did their best to get the thing straight, but suffered under the difficulty of having to translate technical language, in which the Spanish tongue is not at its best. They succeeded fairly well. I was surprised at the poor reports in the Philadelphia papers. They have no regular yachting writers like the New York and Boston papers, and their stories were very deficient and incorrect. It is no use giving a story of this kind to a man who has no knowledge of the sport. You might just as well send a sermon reporter to write up a horse-race.

* * *

Much regret was felt and expressed by all hands over the trouble on Loantaka. She was a handsome boat, by far the best looking of the lot, and all hands would have been proud to have seen her lying in Habana Harbor. The disappointment of her owner and crew was sad to witness, but they certainly had all our sympathies, with hopes for better luck next time. It emphasizes again the need of long and close preparation for these races. Nothing can take the place of time, and no engine should start unless it has been well run, not on the blocks, but in the boat. I have never known it to fail when a new machine goes into a long race, but what there is trouble. It is not fair to the engine maker, as it is impossible for him to explain that the engine was new, and that the trouble arose through it being forced to a strain point before things had worn into running shape.

* * *

The Camden Motor Boat Club very kindly placed their house and basin at the service of the committee and the boats were measured there. The officers also provided a generous lunch and did all in their power to help matters along. All hands greatly appreciated the courtesy and Caroline, as a slight acknowledgment of the attention and assistance received, carried the club's colors across the line at the start. The Seaside Club of Atlantic City also came generously into the game and put up a $500 cup for a race home. They also looked after the returned mariners in good shape; but unfortunately the finish was spoiled by bad weather, it being wet and foggy, so that promised festivities had to be postponed.

* * *

Among those who looked after the yachtsmen while in Habana was Mr. Leon J. Canova, the English editor of La Lucha. He being an old sailingman was greatly interested in the event and did his best to entertain the visiting mariners. Mr. Charles O'Donnell, a former Boston yachtsman, a member of the famous Commonwealth Club, was another standby, as was Mr. Echeverria, who never slept from the day of the finish until we started away again. It was a much harder week for the entertainers than the entertained, but all hands got safely through it.

* * *

It is no use going into these races with under-powered boats. The handicap won't help you out, and if you haven't plenty of engine you had better stay at home. What a low-powered boat loses in head weather she cannot make up in fine. It is only necessary to examine the positions of Caroline and Caliph on the run home to see this. Just as soon as we got the head wind Caliph walked away from Caroline at a speed of over two knots an hour; with fair wind we almost held her. Caroline could hold Ilys with a fair wind, but with a head wind the little boat went right away. It is also difficult to maintain a course with an under-powered boat; they make excessive leeway with the wind on either bow or beam. All these long races have been won by the heavily-powered craft; for as Providence is said to be on the side of the big battalion so it is on board the powerful boat.

* * *

In the navigation between Philadelphia and Habana there was involved only one serious problem—that of keeping out of the Stream going down and in it coming home. The Stream manifests its influence all the way from Hatteras to within a few hundred yards of the finish, and is no mean antagonist, as it flows at a rate of from one to three miles an hour. There are two courses by which it can be dodged, one inside or to the West, and one outside or to the East. The inside course runs over soundings, the outside covers the deep water, until the Bahama Banks are gained. The outside course is one used by the West India steamers, the inside by tows and small coasters. Owing to this Stream and its offshoots of current, it is at times difficult to keep a vessel on a course, as there is no positive knowledge of the direction, rate, or position of the currents. Oftentimes a vessel will be swept several miles out of her course, where a few days before she experienced no current. Men who have sailed these seas for years cannot give any definite advice as to either the set or rate of these offshoot currents. One thing seems certain, that the swiftest flow of the Stream is along its western edge where it is pressed against soundings. To escape the current it is necessary to keep in shoal water, and hug the Banks and reefs as close as possible. This in going down all the boats did.

* * *

Of course there was a lot of talk about the advantage of the two courses, the one inside and the one outside the Stream. I cannot see that the inside course has any advantage over the outside, and the fact that the winning boat went down inside does not prove that it is the better; but to that conclusion did the average man

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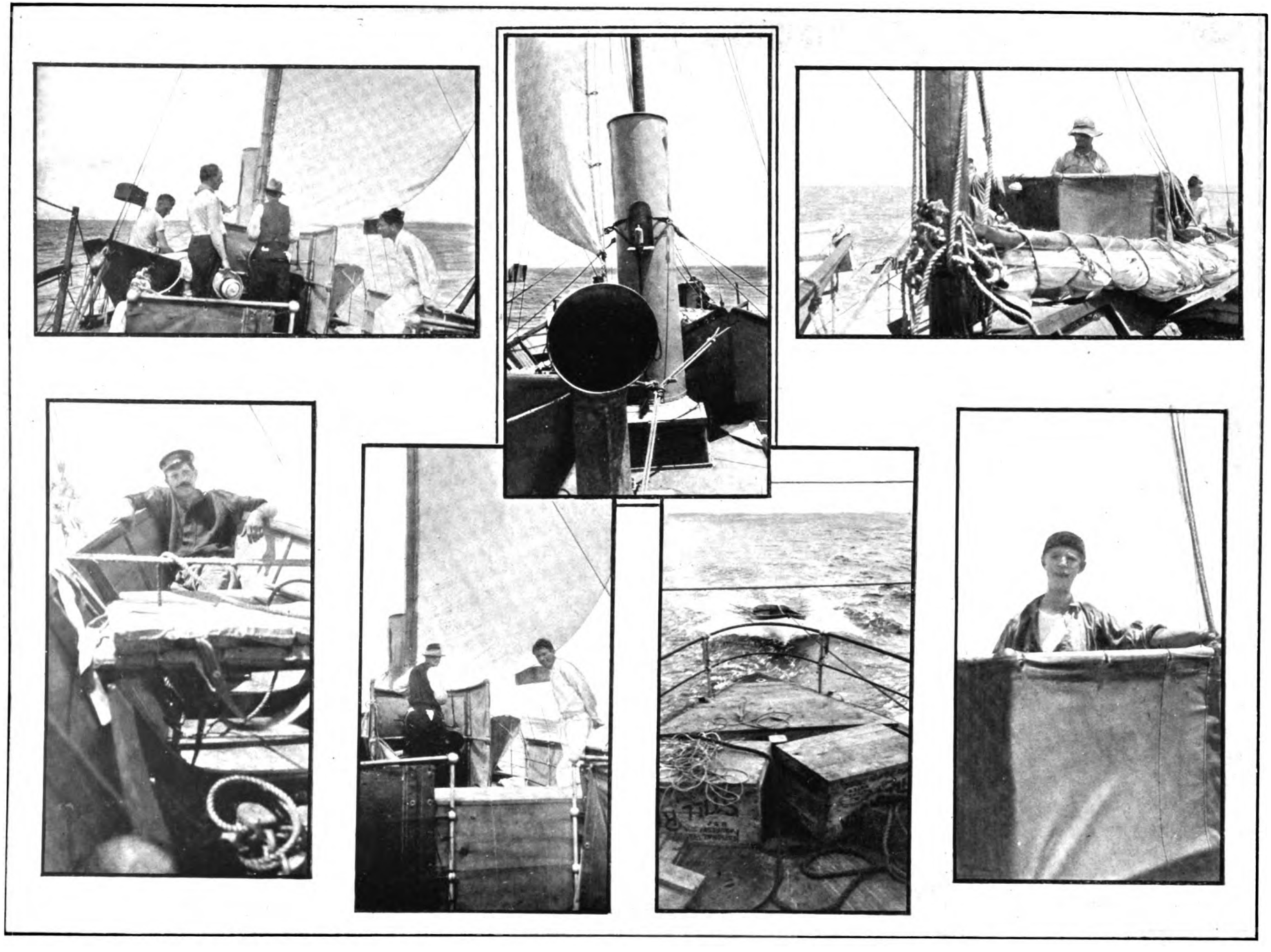

Views Aboard Caroline in Habana Race

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jump. In the first place it is universally conceded by mariners that you will get better weather in June East of the Stream, and are very likely to enjoy a beam wind out there, when inside the Stream it is blowing Southwest. That we did not get this this time was unfortunate; but for some reason the trade was not North of the Banks except as a South or South by West breeze. On the outside course you only have three places to pick up, Hatteras, the Bank and the Elbow; on the inside you have Hatteras, Lookout, Frying Pan, Carnaveral, Jupiter, and a string of lights round the reefs. So far as the current and crossing the Stream is concerned, it is no worse crossing at Hatteras than it is off American Key. I was talking about the course to a man who has made the passage between New York and Cuba hundreds of times, the celebrated filibuster, Captain O'Brien, more famously known as Dynamite Jimmy. He unhesitatingly recommended the outside course, and if anybody ought to know he is the man. I also talked with another Skipper who had sailed to the Spanish Main countless times, and he said at this time of year it is the only way to Cuba. Captain Loveland of Caliph was coming the same way but the boat was heavily loaded and by the head; after passing Hatteras they stood across the Stream for about two hours; but finding that she made bad weather turned and went back inside. There is no question but what there is some current between Hatteras and the Bank, but I doubt if you can escape it anywhere. Close to the Bank we had a current setting East about one-mile speed. Between the Elbow and Habana the current was one mile, perhaps a little more, but to offset this was a fine trade wind.

The home run was made in remarkably fast time, and shows the difference between having a current with and against. All the boats practically followed the same track, keeping in the best of the current, which is between the center and western edge of the Stream. Until off Frying Pan, Ilys was the boat farthest to the East, Caroline was in the center, and Berneyo West; Caliph ran almost the same track as Caroline except that she went outside instead of inside Lookout Light-Vessel. The run home brought no difficult problems of navigation, as it simply meant keeping in the Stream, and if the wind had held to the southward this would have been done to Hatteras, and remarkable time been made, but the shift of wind drove the rear boats out of the Stream into the cold water, as it would have been impossible to make any progress against the sea a Northeaster kicks up when blowing against the current. We had good sights on Caroline every day except Wednesday, when it was thick and rainy. The others, I believe, were also favored by the sun.

* * *

All the talk about bad weather is nonsense; there was no bad weather, nor was the sea at any time rough. It was disagreeable, but a head wind and rain always make things nasty. The spell of weather we had in last year's Bermuda race was worse than any weather this time. The largest sea we had was the last day, when running for Habana with the wind dead astern; but they were long and kindly and the boat raced with them without getting even a spray aboard. Going down from Hatteras to the Bahama Bank, the wind was steadily ahead but at no time was it more than a strong breeze. But such weather puts the stopper on low-powered boats.

Crew of the Victorious Berneyo on Arrival at Habana

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The gasolene proved to be an easier problem than was expected, the boats being easily able to tank the required quantity. All four craft had fuel left when they reached Habana. It was impossible to get the exact consumption, but I understand that Caliph used approximately 1,000 gallons, Ilys 800, and Caroline 750. There is no reason why the boats could not carry enough fuel for a 2,000-mile run, without being heavily overloaded. The cylindrical tanks again proved to be the best, and I am of the opinion that built-in tanks, no matter how well made, are not to be compared with the steel tanks for safety. In the steel tanks there are only two places for a leak, and these are easily to be found and examined; whereas in a jointed tank there are a hundred spots for leakage, and how, if leaking, are you to get at a built-in tank? Such tanks cannot be got at except by tearing up the decks. There is no trouble in securing the cylinder tanks, and I certainly advise their use for seagoing.

* * *

A mistake was made in starting the race so late. A race to Habana should get away early in April. The weather is too warm in the latter part of May and June. Besides June is always a more disagreeable month South of Hatteras than May. There is no reason why with the long notice of preparation that a boat can be ready in April. It is my experience that men will put off to the last getting ready no matter what date is fixed. Also some fair system of handicapping should be devised and agreed upon this Winter to be used in the races next season.

Through its Mayor, Senor Cardenas, the City of Habana has offered a valuable cup for a race next year, a second trophy has been tendered by Senor Rivas, so that a contest is assured. It is also probable that a boat flying the Cuban flag will be entered; if so, this will add much to the interest of the contest. I would suggest breaking the entries into two classes, one over and one under 60 feet, and offering a prize for each class and one for the fastest time. This would add much to the zest of the race, as it gives the smaller and slower boats some show of getting a win.

* * *

Starting the race right off the City of Philadelphia, and the participating in it of the civic authorities did much to stir up the public to take notice. They saw the actual thing close aboard, and it was a real event, not a shadow falling out of the columns of a newspaper. If a sport is to live and keep spreading it must interest the public, because out of the public come the recruits who fill and swell the ranks. Those whom we privately reach by acquaintance are few, compared with the thousands the newspapers and other prints come at. That is where these ocean races strike iron. The newspapers must notice them, because they are not only sporting events but news, and they contain and offer a certain amount of sensation that appeals to the average newspaper man. They are gigantic ads for the sport, and are responsible for bringing in thousands of new men. I have always opposed starting and finishing these races in out-of-the-way spots, but this is the first time my way was allowed, and it was a success.

SUMMARY

Philadelphia to Habana

Start Saturday, May 21st, at 1:45 p m.

	Finish	
Caliph	Friday, May 27th	6:03 p.m.
Berneyo	Friday, May 27th	7:05 p.m.
Ilys	Saturday, May 28th	10:36 a.m.
Caroline	Saturday, May 28th	6:38 p.m.

Actual Elapsed and Corrected Time

	H. M. S.	H. M. S.		H. M. S.	H. M. S.
Caliph	149:17:36	149:17:36	Ilys	165:44:16	154:31:12
Berneyo	150:18:35	146:33:31	Caroline	173:39:44	163:17:07

Caliph.—Time, 6 days 5 hours 42 minutes. Run, 1194 miles. Average speed, 8 knots. Day's runs, 210, 204, 185, 160, 190, 199, and 46.

Rating and Allowance

	Rating	Allowance
Loantaka	47.82	Allows
Caliph	44.34	7:50:03
Berneyo	42.78	11:35:07
Caroline	40.37	18:12:40
Ilys	40.08	19:03:07

Finish at Key West, Sunday June 5th

Caliph	2:10:50 a.m.	Ilys	3:36:05 a.m.
Berneyo	2:42:06 a.m.	Caroline	3:37:00 a.m.

Elapsed Time from Habana to Key West

	H. M. S.		H. M. S.
Caliph	8:10:50	Ilys	9:36:05
Berneyo	8:42:06	Caroline	9:37:00

Finish at Atlantic City

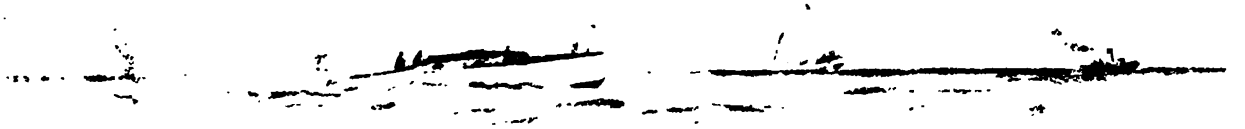
	Finish	Elap. Time H. M. S.
Caliph, Thursday, June 9th	11:06:00 p.m.	101:51:00
Berneyo, Friday, June 10th	7:58:20 a.m.	110:43:20
Ilys, Friday, June 10th	1:26:45 p.m.	116:11:45
Caroline, Friday, June 10th	5:11:28 p.m.	119:56:28

Elapsed Time from Habana to Atlantic City

	H. M. S.		H. M. S.
Caliph	110:01:50	Ilys	125:47:50
Berneyo	119:25:26	Caroline	129:33:28

Total Elapsed Time from Philadelphia to Atlantic City

		Speed			Speed
Caliph	259:19	8.8	Ilys	291:32	7.9
Berneyo	269:44	8.5	Caroline	303:13	7.5



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ON THE LAST BOAT

CAROLINE is a large boat with a small engine. With the exception of Loantaka she was the largest boat entered and had the least power. She had no chance of winning, unless the other boats broke down, her maximum speed being 8 knots. She is a beamy, shallow-draught hull, and like all such boats with the wind on the beam or bow makes excessive leeway. While trying her out on the way round from New York we ran her on a straightaway course for sixty miles and she made a point and a half leeway. This was with a strong S.W. wind on the bow; with an ordinary wind she would make a point leeway and sometimes more. The throw of the propeller may have had something to do with this, as I have noticed often in shallow wide boats. Outside of this peculiarity, for which she is nowise to blame, she was a dry, able and comfortable boat, in fact, I never put foot in a more comfortable craft. In her I would not have hesitated to ride out a real gale. From start to finish although plugging for several days into a head wind and sea, we never closed the ports or companionway, and never saw a pound of solid water on her deck. She was also a fine runner and steered like a lady. The same dimension, and general shape, two feet deeper and with sharper entrance, would be the acme of a sea-boat.

While the deck tanks were full she rolled lightly and easily, and you could leave anything on the table without its being disturbed. She was not so docile when lightened up. The engine was a regular stock 25-h.p. Standard, that had been run for one season. This engine was about two sizes too small for the boat, and it seemed cruel to make the little thing push that big craft, but it did. I never saw such an astonishing piece of work. How that little engine ever shoved that boat up against wind and sea beats my philosophy.

She had on board a little over 1,000 gallons of gasolene; this was stowed in the permanent tank aft and nine temporary steel tanks. Two of these were aft on the deck, containing 250 gallons each, four in the main saloon, two in the engine room, and one small one of 25 gallons as a forlorn hope in the forepeak. These tanks were secured in the most substantial manner, and the job does credit to the man who planned and executed it. The piping was also first-class.

She was rigged as a sloop with double headsails. The sails were nothing to boast of. The mast was stepped on the keel and well stayed, but proved to be too light at the head, a defect which did not manifest itself until we tried to sail without the engine. Being a slow boat the sail was of considerable help to her.

The crew was a good one, four fine helmsmen, two good engineers, a crack-a-jack Japanese cook, and a boy, very willing and very dirty. Two of the crew left at Habana and on the home run we shipped two castaways at Key West, who proved to be good men.

I knew the speed of Ilys from experience and had reliable information as to what Caliph could do, so recognized that unless something happened to stop them we had no chance. Berneyo I was told could make nine-and-a-half, and she certainly did at the start, when she walked right by us. Knowing they had us beat it was no use following in their wakes, so I determined to go down outside and trust to picking up the Easterly wind to the South of thirty. This usually blows quite strong and would have helped Caroline a lot.

The race down to Henlopen was a procession, with Berneyo first and Caroline at the rear. Caliph had been leading but something happened and she dropped back, so that we held her to the Cape, which we passed about thirty minutes behind the leader at a distance of one mile.

Running off S.E. for half an hour I put the boat on the course to go clear of Hatteras and bid good-by to the light, which was soon lost in the fog. All that day the fog lasted with a calm sea. At noon we were in 75° 10′ by dead reckoning and 37° 31′ by observation, having made 190½ miles since leaving Race Wharf. At this the boat was doing her best, including tide, of about 8 knots. All afternoon weather was thick, and the same at night. At close to 4 a. m. we passed Hatteras and stood across the Stream steering South by West. The weather in the Stream was good, being very little wind and a slight roll. It was my intention to run South by West for twenty-four hours and then make a straight course for Mantanilla Shoal on the end of the Bahama Bank. If I could make this in the daylight to cross it, if not, to cut across the Stream to Jupiter and follow round the Keys, but an unexpected situation arose which necessitated a change of plans.

Tuesday morning one of the crew came to me and asked if I knew how much food was on board. I answered "Plenty." "No," said he, "there is not enough for three days." Going down below I got the steward and went over the stores, and little enough there was, not sufficient to feed ten men for three days. Here was a nice fix. We were nearly 200 miles from the nearest port, might be delayed by heavy head winds for a week, or have a breakdown. Out of the usual track of vessels we might drift for days without seeing a sail. If we made for the reef, missed it, were blown into the Stream, we might be a week getting into port, and by that time would be starving. The only thing to do was to work down on the Bahama Banks, and if the stores were gone to anchor, and try and get something from Abaco or Bahama Island, so instead of going over the shoal I determined to make Walker Key Channel and go through there, thence over the Bank into the Strait; this is shorter by several miles than the other way. On Tuesday the wind came out ahead and blew strongly from the South and South by West, the boat dropped off to 5 and 6 knots and sometimes less. The weather overhead was fine and that night we saw a perfect eclipse of the moon. On the 24th at noon she had only made 155 miles, about 6½ knots. The next day she did worse, 145, and from noon of the 25th to the 26th her distance was 130 miles. This day we had the hardest wind and most sea and one

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The Engineers of Caroline

watch we only made 16 miles. On the 23d we passed a steamer bound North, which reported us; on the 25th another; these were the only vessels we saw. About one hour after the steamer passed we ran into a fleet of beer bottles, and some of the crew insisted that Berneyo or Caliph must be ahead because they had beer aboard.

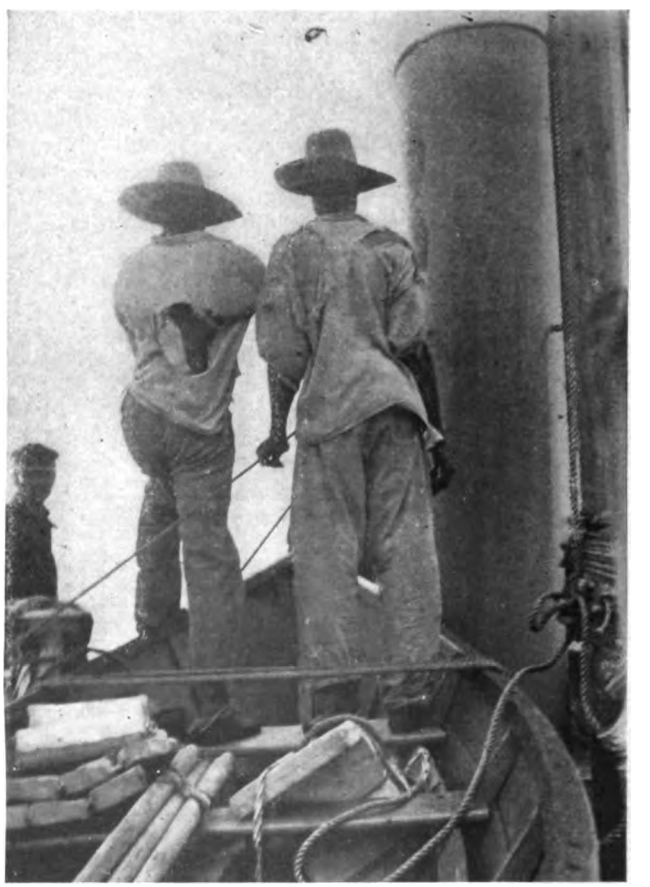
We had a couple of fools on board. One of these was the biggest ignoramus ever I saw aboard a boat, and I've seen a good many. He had never been to sea before, was absolutely ignorant of navigation, and did not know the points of the compass, and like all fools of his type was constantly butting in and making silly remarks and comments. He seemed to have an idea that you could read the position off the sextant and when he found out this could not be done he denounced the instrument as being no good. Whenever these wisemen asked where we were we told them we didn't know, and as they did not know the difference between latitude and longitude the statement of the position was of no use to them. One day the assistant navigator came and told me that they were sneaking looks at the chart, so I went down and put a lot of fictitious positions on it; this threw them into a frenzy of fright. As the Keys were in sight at the time the watch on deck had a good laugh.

One of these wise-fools suffered from an hallucination that the boat was off the course. As he had no knowledge what course she was on at any time, and not knowing one point of the compass from the other it is impossible to say upon what grounds he based his fears.

At this time, owing to want of proper food, the crew were getting mutinous, and it was suggested that we throw up the race and put into Nassau or one of the Florida ports and get a square meal. There was nothing much left on board but eggs and canned beans, a food that most of us detested. Luckily I had bought a crate of oranges at Camden and these helped out. After a talk I persuaded the boys that we could get to Habana almost as soon as to the other ports if the wind went fair, so they agreed to hold on. The last day all the tobacco was gone; nobody had brought a large supply supposing, as is always the case, that cigars and cigarettes would be supplied from the boat's locker. There were none on board and we were as tobaccoless as a North-bound Cape Horner. On the morning of the 26th I had an interview with the Jap steward and he said he thought he could scrape enough grub for two days more, in which time with a fair wind I hoped we could make port. That morning I got a line of position and put her on the course to run for the Channel. I was never on the Little Bahama Bank before and was anxious to see what it looked like. I have been on the Great Bank several times. I had been told and read that the current North of the Little Bank sets to the westward, but this day it set East and at noon had carried us some 8 miles East of our proper landfall. We came in on the Keys off Double Breast. At eleven o'clock rain-squalls showed to the South, which is a sure sign of the Banks, as they are continually hovering over the rock and shedding their tears. This and the heat from the land makes a sight unreliable, and you can never trust observations taken over them. The sun would jump up and down; from being footed on the horizon you would look a half-minute after and find it galloping a head high. Sights in the Gulf are also at times unreliable owing to excessive refraction.

At two o'clock I saw the loom of the land, and having got in the lee and the wind going light we made better time and ran down and along it. All the Keys look much alike and unless you know them it is almost impossible to tell one from the other. But Walker can be told from its being the last Key with vegetation, West of it are only bare rocks.

There are no people living on these outer Keys, except those who come to sponge and turtle; but I expected to pick up one of these fishermen and get him to pilot us through the Channel and on to the Bank on the other side. About three o'clock somebody saw ahead what he pronounced to be a buoy, but which turned out to be two colored spongers standing up in a small boat. Running alongside I hailed and asked them to come aboard and pilot us through the Channel. This they did, one taking the lookout and the other the wheel.



Pilots Who Took Us Through the Keys

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The Walker Key Channel is a good passage, and very easy to go through with a light-draught boat in the daylight, as you can readily see every danger. The least water is over two fathoms. It leads on to the Bank on the other side with an average depth of six fathoms, this varying to four extends for 35 miles to the edge, where you get three fathoms and then no bottom. The Bank is white sand and the usual dark patches, but there is nothing you can hit except what are known as the Lily Pads, a space of shifting sand-bars, like those on Nantucket Shoals. These are soft and harmless.

A quarter to six the pilots left with ten dollars and a pair of oars for their trouble, and started back home, a small matter of about 20 miles, which did not seem to concern them.

The pilot told me to go off the Bank through Memory Rock Channel, which has a least draught of three fathoms and is over two miles wide, the rock being in the middle. Like most fishermen he had a very hazy idea of compass direction, knowing like a bird by instinct where things lay. There was strong tide running with us and setting the course direct for the rock we started West-South-West. After running about one hour I saw the Lily Pads ahead, the rips breaking up full of white sand. To go around these meant a detour of two miles, so we shot her right across, the last one the wheel hit the sand wave and she hurdled it like a horse. The Bahamas are famous for fine sunrises and sunsets, but the sunset this night was without question the most magnificent I have ever seen.

At ten o'clock we struck the outer lip of the Bank and going over with the lead dropped into the deep water, and turned her South to pass Great Isaacs and Bimmini Islands.

The wind had now gone to the East and with all sail set the boat was making speed, but the three bad days had put her hopelessly out of the race. At 5 a. m. we were off Great Isaacs and working inshore to keep out of the current. At eight o'clock we were off Bimmini and the pirates came off to intercept us with their wares, but we had no time for barter, it being a race against starvation, and much to their chagrin we ran by with only a hail as to whether they had seen the other boats.

From Bimmini, I ran to a position off Gun Kay, and then made for Sal Kay Bank, intending to go over it behind the keys, thus cutting off quite a distance and keeping clear of the current. The least water on Sal Kay is about three fathoms, and there are no dangers except such as are above water. This Bank was a favorite hiding place for the filibusters during the Cuban revolution, they laying there until a favorable opportunity presented for running a cargo over to the island. The Bank is almost circular and is fringed with keys on its edges.

At eleven, having run the distance, I saw what looked like the rocks, but a rain-squall making up could not be sure, so stopped and sounded. No bottom. Stood on for ten minutes longer, heard surf, stopped and sounded. No bottom. Stood on five minutes longer when I knew by the sea we were on the shoal, took the lead myself, and found three fathoms. This shows how risky it is to trust to green leadsmen. We had only one good leadsman aboard, Thurber, and I sent for him to come on deck. At this call what the assistant navigator called the "Brain Trust" flew on deck and went into hysterics. They yelled that they saw rocks, that the boat would be cast away, and behaved like crazy men. As we had been industriously looking for the rocks and wanted to find them so as to get a departure across the Bank, this was news. I was so disgusted at this exhibition that I turned the boat's bow off into the deep water again, and ran off the Bank.

If a man is afraid of having his boat wrecked he has no business in these races. In order to do anything you have to take chances, sometimes desperate ones, and in racing I will go anywhere to save time if there is six inches of clear water under the keel. If you are not racing it is foolish to take such risks. But the absurdity of it is that you sail around here where you can't see bottom in 12 or 15 feet of water and think nothing of it; then why fly into a fright because you can see the bottom when in 30 feet?

Coming off the Bank we shaped a course past the Elbow and a beeline for Habana. The wind was now blowing the trade and with all sail set the old box humped along, making over 9 knots through the water. This was the best gait and best day's run. We passed the Elbow at 4 a. m. and the distance was such that I calculated if we held the breeze to get in between six and seven. About nine o'clock the wheel rope parted and we had to steer with the tiller. Shortly after the jaws of the gaff went; the wiseman who built them having made them too small in the horns to properly straddle the mast.

At noon we had a fine sight and it placed us off Matanzas; at one o'clock the Cuban coast came up over the horizon. All food was gone by this time and we were a hungry crowd. I couldn't eat the eggs and had nothing all day but a few beans, a food I detest.

At three o'clock we saw the head of the great wireless tower behind the Moro Castle show up, and at five the large white building this side was in sight. It was a beautiful day, a strong wind and a long, flowing sea, over which the boat ran, making play with rollers. At 6:30 we came abreast of the Moro, and at 6:38 ran in across the line.

DAY'S RUNS

	Miles
Start to noon, May 22d	190.5
to noon, May 23d	169
to noon, May 24th	155
to noon, May 25th	145
to noon, May 26th	130
to noon, May 27th	194
to finish, May 28th	204
Total	1187.5

Time, excluding difference, 173 hours 53 minutes; average speed, 6.8 miles.

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THE FESTIVITIES

HABANA, the largest and wealthiest city of the West Indies, is situated just South of the tropic on the North shore of the island of Cuba. It has an almost perfect harbor. The entrance to this basin being between rocky shores steep-to, and opening into a fan-shaped harbor capable of giving anchorage to a considerable fleet. The city sits on the West side of the entrance. The East shore is higher, and boldly thrusting toward the sea its lofty white walls, a conspicuous mass to be seen for miles, stands the celebrated fortress, the Moro. Behind the Moro and running along the East ridge of the harbor basin is another enormous defensive work called La Cabana. Like all old Spanish-American cities, Habana was formerly guarded by a wall, and this congested the older portion, so that the streets in that part are narrow, and the place resembles one of the medieval towns of Europe. But the newer portion, built outside the walls, is widely laid out, and possesses one street which for beauty is scarcely equaled in America. The city is remarkably clean, orderly, and exceedingly well policed; in fact, in these respects it is unequaled by any city of its size in the United States. Although a place of great gayety there is never any disorder or petty ruffianism such as we constantly witness in New York, and during the seven days the yachtsmen remained in Habana they were treated with the greatest courtesy and attention by all classes. The Government officials, clubs, hotel people, and newspapers spared no trouble or pains to make the visit a pleasant and joyful one.

The Habana Y. C. is an organization of about three hundred, it has no town house, its place being situated on a cove about eight miles West of the City. This place where the people go to bathe is called the Playa de Marianao. It is not a very good harbor, being just a slight indentation of the coast, but with the wind off land an anchorage can be found there. The clubhouse is an airy, spacious building, open to the blessed trade wind, which all day Sunday blew through it, making the place comfortable.

The first function arranged by the Habana Club was a breakfast at the Playa house, and this was slated for Sunday morning at ten. In Cuba a breakfast is really one of two dinners in which they indulge, and not an excuse for a meal like our early feed. It was agreed that we should take all the boats around and anchor them off the house. This we did.

The house was beautifully decorated with bunting and in the bright light under the shade of the palms made a pleasant picture. A large crowd was gathered to welcome the boats and men, it being said that the turnout of members was the largest the club ever had.

The tables were laid in the dining room, seats being placed for three hundred. The headquarters band, on the piazza, played during the meal, and played well. At eleven o'clock President Gomez arrived, accompanied by his Naval Aide, Captain Morales Coello, and with the party was Mayor Cardenas, and a large number of Government officers. President Ernesto Perez de la Rivas presided. To his right sat General Gomez, with Messrs. Brigham, Granbery and Commodore Whitaker on either hand.

After President Perez had welcomed the visitors the usual toasts were drunk, and Captain Granbery, owner of the winning boat, was called on for a speech. He was followed by Commodore Whitaker and the others, the concluding remarks being made by Mr. Day. The owners of the boats were presented with gold fobs by President Rivas. During the speech-making Mayor Cardenas, in the name of the City of Habana, offered a $1,000 cup and $1,000 in cash for the race next year, and President Rivas in the name of the Club supplemented this with a $1,500 cup and $1,500 cash prize. One of the members also announced his intention of building a boat and manning her with a Cuban crew, for next year's race.

These announcements were applauded long and loud.

At the conclusion of the breakfast the crews were introduced to President Gomez, and then called before the Mayor and presented with silver medals, the gift of the City of Habana. Each of these medals was accompanied by a certificate.

Monday it was planned to take the visitors to Matanzas and visit the caves of Bellamar, and give them a sight of the celebrated Yumuri Valley. This city, the second in size in Cuba, is less Americanized than the capital, and is consequently not the less interesting to Northern eyes. It is situated on a splendid bay which is fed by two rivers, the San Juan and the Yumuri. The riding time by rail from Habana is about two and a half hours, and the road runs through a picturesque and interesting country.

A special train left the Villa Nueva station at 8:30, made up of the President's car and a day coach, with all the necessary libations on board. A party of forty-two took the cruise. On arrival at Matanzas the crowd boarded about two dozen oatsmobiles and started for the caves. When the entrance was reached it was suggested that as much clothes as convenient be left at the surface as the cave was warm, and this statement proved true. The cave has no other opening, so there is no draught through it like most caves.

All caves are very much alike and Bellamar, once beautiful, has been much marred by the use of torches. It is now lighted by electricity. After the caves were done the crowd rode back to the city and stopped at the Hotel Louvre for breakfast. This was a fine meal and heartily eaten by all hands. If you go to Matanzas stop at this hostelry. In the square is an artistic, in fact beautiful statue of Marti, the Cuban Washington. The figure at the base, typifying Cuba breaking her chains, is magnificent. Such statues as the Cubans have put up since obtaining their liberty are all in good taste, not awful eyesores like the majority of our bronze heroes. No nation whose eyes are trained from generation to generation to read type will ever produce artistic buildings or statues. They are the product of eyes that have had for constant contemplation natural objects.

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After breakfast the oatsmobiles were again boarded and a course laid for the heights overlooking the Yumuri Valley. This is right across the city from the caves, and up a steep hill. On the crown of the hill is a shrine or hermitage dedicated to the Virgin, in imitation of a similar place in Spain. The hill on the West side drops quickly into an expanse of level valley dotted with palms and huts, and segmented by the slowly flowing reaches of the Yumuri River. Over and beyond girdling this vale, circle the hills, blue and indistinct, verdure crowned, and between their crests, here and there flashes a touch of silver sea. It is a picture such as painters dreamed of Arcadia, except that it lacks the colonnaded temples and the dancing, wreath-crowned nymphs. The hermitage is the usual unpretentious and ugly building, and rather disfigures than adds to the beauty of the landscape.

Tuesday, the 31st, was spent quietly, the yachtsmen breaking into groups and piloted by a club member going the rounds of sightseeing. That night we were invited to a dinner at the Miramar Gardens. This was tendered by Mr. George M. Bradt, owner of the Havana Post. This was one of the handsomest banquets ever given to yachtsmen, the setting of the tables and the decorations being beautiful and unique. The table was arranged in the form of a cross under the open sky, and seated two hundred guests. At the intersection of the arms a large pyramid of native fruit was placed and from it through the center of each stretch of table ran a bank of roses and other blossoms. Another decoration was large cabinets containing cigars made of unpolished Spanish cedar. At each plate was a small silk Cuban flag. This is the menu:

Canapes Mirabeau
Essence de Tomate au Riz
Loup de mer a L'etuvée
Pommes Vapeur
Tournedos Martin
Petits pois Monegasque
Dindonneau Roti
Cranberry Sauce
Salade Saison
Bombe Glacée
Gateaux Assortis
Cafe
Liqueurs *Cigars*
Vins
Capriano Roig, Rioja Clarete
Champagne "Monopole"
Champagne "Codorniu"
Martini Cocktail

At the head of the table sat the host and on either side the Government officials and visitors, among the former being Vice-President Zayas, whose face impressed one as that of a statesman. He somewhat resembles in appearance the celebrated Henry Clay and is, I was told, a very brilliant and logical speaker. After all were seated Mr. Bradt arose and proposed a toast to all hands in these words:

"I propose a toast to our guests. Here's to the big men and the hearty crews of the little boats which came across the seas to visit us way down here in Cuba; here's to Whitaker of Ilys, and Granbery of Berneyo, and Brigham of Caliph; here's to the two finest flags in all the world and to Cuba's President, José Miguel Gomez, and the President of the United States, William Howard Taft, and to Vice-President Zayas and to our Alcalde, Dr. Julio de Cardenas; to the Yachtsmen's Club of Philadelphia and the Havana Y. C. We wish our sailor visitors, now that they have come here once, that they will come again, and can assure them that they will always find a most hearty welcome awaiting them in sunny Cuba."

"I noticed Sunday displayed in your banners and embodied in the arms of your city a key, which I understand is symbolic of the belief that Habana is the door through which trade and commerce must pass to enter these delightful regions of the Indies. But to-day, gentlemen, that key has become symbolic of a closer and dearer office. To myself and my companions it represents the astonishing and almost incomprehensible hospitality of which we have been recipient during our visit. This hospitality has entered and found the deepest wards of the heart; it has shot the bolts of affection and gratitude, and from now until we lift our anchors for the last voyage, we Mariners of the North will think of your Habana, not as the door through which flows the trade and wealth of the Indies, but as that proud and lofty portico through which we entered into a grand fellowship, a fellowship as wide and deep as the ocean which sparkling joyously under the constant trade wind washes and guards the palm-crowned shores of your beautiful Cuba."

The Closing Words of Mr. Day's Speech at the Habana Post Dinner

Much singing and speechmaking followed, the whole being rounded up by Mr. Day who, after talking in his usual strain, closed by thanking the Cuban people for their generous hospitality to his yachting companions. Among those who spoke were Commodore Whitaker, Judge O'Neill, Colonel Teller, and the Vice-President. Among the principal guests were:

Capt. Moralles Coello, representing President Gomez; Vice-President Alfredo Zayas, Governor Ernesto Asbert, Hon. Manuel Sanguily, Hon. Emilio del Junco, Hon. Francisco de Paula Machado. Hon. Mario Garcia Kohly, Commodore J. G. N. Whitaker, Vice-Commodore M. E. Brigham, and the crews of all the yachts, Col. R. E. Ulbricht, W. Nelson, Mr. Weingarten.

Charles Harrah, Vice-Commodore; Domingo Morales, Secretary; Juan A. Lliteras, Vice-Secretary; Philip Hammond, Vice-Treasurer; Charles M. Echeverria, Fernando de Cardenas, Armando Riva, Charles O'Donnell, Rafael Prendes, Alberto Balje, M. Burrows, Benigno Diago, Capt. W. F. Smith, W. H. Smith, Mr. Winston, Maj. H. A. Barber, Capt. G. G. Gatley, Capt. Frank Parker, O. A. Hornsby, J. C. Martin, Narciso Macia, José Marimon, F. W. Ross, John R. Caldwell, E. de L. Slevin, Ricardo de la Torre, Francisco Rojo, Modste Morales, Floyd J. Miller, the editors of La Lucha, El Mundo, Diario de la Marina, La Discusion, Diario Español, Cuba, La Prensa, El Comercio, El Figaro, El Choteo.

The memory of this banquet under the stars will long be remembered by those who were there, nor will they easily forget the kindness and attention of Mr. Bradt

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who, during our stay, was constantly at the yachtsmen's service.

Thursday night a ball was given at the clubhouse, and during this function the cups were formally presented to the winners. A large number of members and friends attended this function. The house was handsomely illuminated and decorated, and the visitors had a good time, not returning to town until the sun was up. Among the people present were:

The American Minister, the Hon. John B. Jackson; the Spanish Minister, and Mrs. Pablo Soler y Guardiola; the French Minister, M. Ferdinand Souhart; Miss Odette Souhart, Mr. and Mrs. Sherwood Yawger, Mr. and Mrs. Charles Harrah, Mr. and Mrs. Ernesto Perez de la Diva, Mr. and Mrs. Demetrio Castillo Duany, Miss Duany, Mr. and Mrs. Francisco Arango, Mr. Ernesto Cuervo, Miss Graciella Cuervo, Mr and Mrs. Dionisio Velasco, the Count and Countess of Montmeja, Miss Hazel Patrick, Miss Ivone Lebroun, Sr. Carlos Parraga, the Misses Carlota, Luisa and Alicia Parraga, Miss Marie Urbizu, Mr. and Mrs. Claudio Mendoza, the Misses Mendoza, Mr. and Mrs. Ramon P. Ajuria, Mr. and Mrs. Ignacio Almagro, Major and Mrs. Henry A. Barber, Mr. William B. Castle, Miss Margarita Castle, Mr. and Mrs. Louis Bernal, Mr. and Mrs. Caesar Manresa, Mr. George M. Bradt, Mr. Enrique Bachiller, Miss Otilia Bachiller, Mr. and Mrs. José R. de Arellano, the Misses Arellano, Mr. and Mrs. Manuel Jiminez Lanier, Mr. and Mrs. Charles Aguirre, Mr. and Mrs. S. Houston, Mr. and Mrs. Arturo Bosque, Mr. and Mrs. Andres Angulo, Major José A. Lasa, Mrs. A. Madge, Miss M. Madge, Mayor Julio de Cardenas, Miss Margarita de Cardenas, Mrs. Kindelan, Miss Cristina Kindelan, Gen. Faustino Guerra, Gen. Armando de la Riva Mr. and Mrs. Arturo Amblard, Mr. and Mrs. Frank Bowman, Mr. and Mrs. Gustavo Alfonso, Mr. Alejandro Gallardo, Sta. Concepcion Gallardo, Mrs. Manrique, Miss Adelaida Manrique, Dr. and Mrs. Julio Ortiz Cano, the Misses Arostegui, Mr. Ernesto Lonja, Miss Alicia Lonja, Sr. J. Torroella, the Misses Torroella, Mr. and Mrs. Buhle, Mr. and Mrs. Enrique Fritot, Mr. Fred Ackert, Mr. S. W. Granbery, Commodore J. G. N. Whitaker, Mr. M. E. Brigham, Sr. Gustavo de Cardenas, Mr. Jacinto Yaca, Mr. Narciso Macia, Jr., Sr. Luis Mendoza, Mr. Julio E. Rabel, Mr. Luis Mendoza, Mr. Eduardo Usablaga, Sr. Alfonso Morales, Sr. Enrique de Cardenas, Mr. Antonio Sastre, Mr. Antonio Santeiro, Mr. Raulin Cabrera, Mr. Alfonso Duque de Estrada, Mr. Eneas Freyre, Mr. Morales, Mr. Nicolas R. Adam, Mr. Joseph Springer, M. G. Belknap, Joseph St. Ker, B. D. Reese, Fred Thurber, Francis Rogers, Carlos Carbonell, W. A. Wintner, Joaquin Miranda, Arturo Lavin, José Izquierdo, José Barraqué, Mr. Alfredo Zayas, Mr. Otto Bhume, Mr. Virrun, Dr. and Mrs. Gonzalo Arostegui, and others.

This ended the official entertainment with the exception of a jolly smoker at the American Club. Here the boys went as boys, the guests of President Wright and Secretary O'Donnell, an old Boston yachtsman, and had an old-fashioned time. Nothing was too good for us, and it will be many a long cruise before we forget the squall that hit the crowd that night at the American and never left a spar standing.

Outside of these public entertainments each of the visitors was well looked after and kept busy and comfortable by a personal pilot who had him in charge. Such hospitality as was showered upon us we might have imagined but never could have anticipated; it was simply astonishing.

I cannot close without thanking the management of the Plaza Hotel for their liberal and courteous treatment. They treated us like kings and charged us like beggars; in fact, they seemed reluctant to take anything. The Manager and his assistants did everything in their power to make us happy and comfortable, and well did they succeed. This was in such direct contrast to what has been dealt out to us at another place that I cannot help dwelling upon it.

Another incident I want to mention. The jaws of a boat's gaff being broken it was taken to a carpenter shop in O'Reilly Street, and the owner asked to make a new pair of horns. He had no oak but agreed to make them of mahogany. This he did, making a good job of it. When the jaws were called for he refused to accept any payment whatever, saying that he was only too glad to do what he could to help the visiting yachtsmen. We found this same spirit manifested everywhere.

Prizes and Winners

Berneyo—City of Philadelphia Cup and $1,000.
Caliph—Yachtsmen's Club Cup and $500.
Ilys—Van Rensselaer Cup and $250.
Caliph—Seaside Y. C. Cup.
Ilys—Havana Y. C. Cup.

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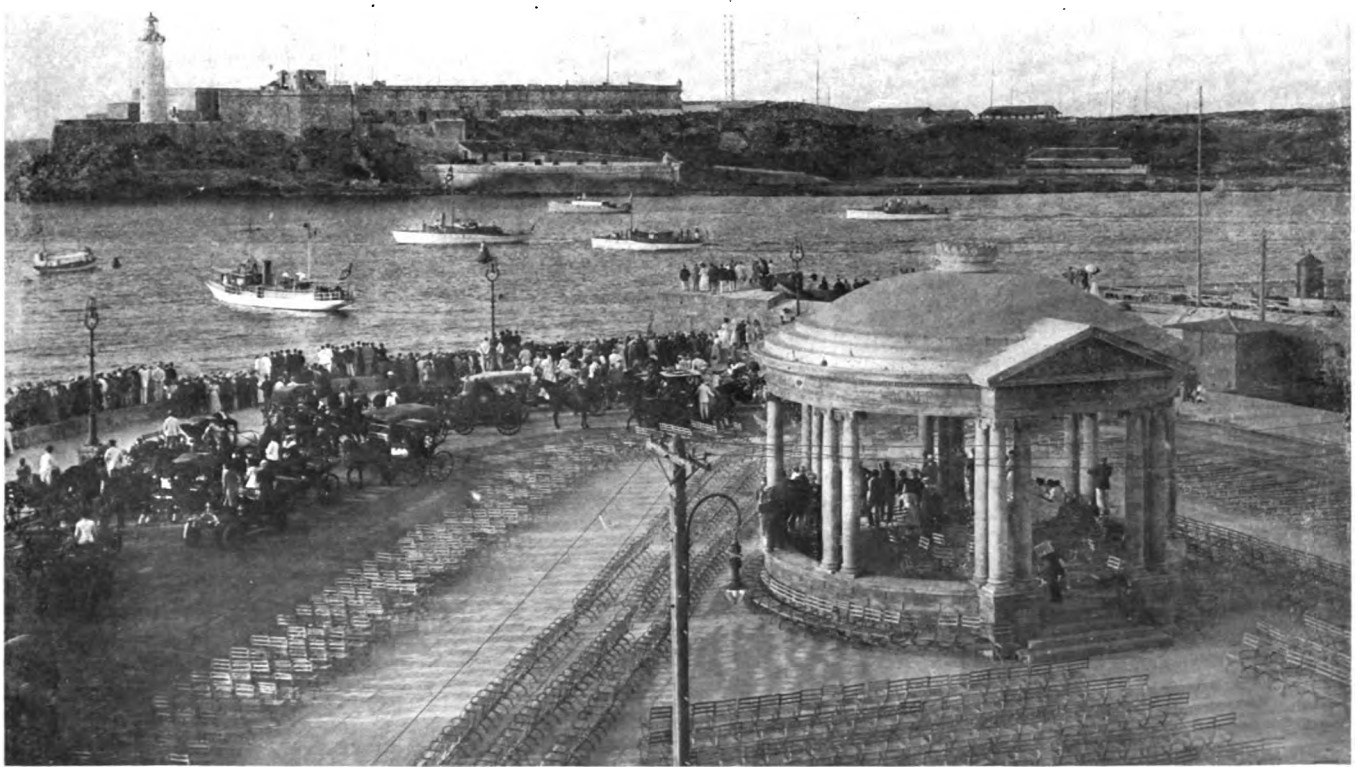
THE RUN HOME

WE HAD a chance of being in the hunt if we were lucky enough to get a fair wind home or a calm, but we knew a head wind would put us out of business. In such weather the other boats could walk right away, so all hands put up prayers for a strong Southwester. We got a bad start going over the line too soon and having to back up. The first port was Key West, where we had engaged to take on gasolene, it being agreed that we should race over there and whatever gain was made it was to be deducted from the allowance and a fresh start made for Atlantic City. The last boat was to have three hours' leeway to get her stores, but this we did not need as we were loaded and away first of the fleet.

The finish at Key West was off the Sea Buoy, and Commodore Carbonel's yacht Gypsy was to go over and be there to take the time. The usual thing happened when a boat starts at the same time racers do to time them—the mark-boat never got there until long after Caliph and Berneyo. In fact she only beat Ilys and Caroline by a few minutes. It was a beautiful evening and we soon left Habana and the cheering crowds on the quays behind and stood North by East across the Stream for the light on Sand Key. Captain O'Brien told me to allow one and one-half miles for the current, which we did, and made the landfall just exactly right, having drifted up about 15 miles in crossing the Stream. The distance going with the current is about 78 miles. We found Caliph and Berneyo at anchor, and Ilys, having gone inshore, came out and finished about 5 seconds ahead of us. Caliph had beaten us over one hour and a half, showing what little show our allowance gave us with her when she kept going.

At daylight we hove up our hooks and went up off Key West and anchored until the Doctor came off and gave us partique. We then hauled into the dock for gasolene. This was some time in coming.

The crew had talked before leaving Habana of jumping the boat at Key West and going home on the steamer or train from Knights Key, but in making inquiries we found that there was no way of getting off the island until Tuesday, so we had to make the best of a bad job and stick to the craft. One of our men, who was in a hurry to get home, we shipped on Berneyo, as she would



Waiting for the Starting Gun in the Shadow of the Historic Moro Castle

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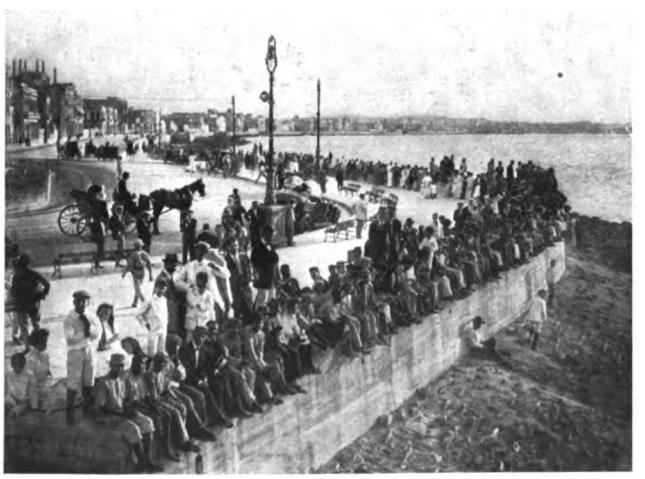
make a faster passage. In his place we shipped two young fellows who were stranded here. They were Marylanders and made good hands, willing, cheerful and the best of company.

The gasolene at Key West was delivered in steel drums and was considerably dirty, and this mud played havoc with us later, as you shall hear. The heat at Key West was frightful and we were all glad to get away from the place. If Satan is looking out for improvements he certainly should not neglect a visit to that island.

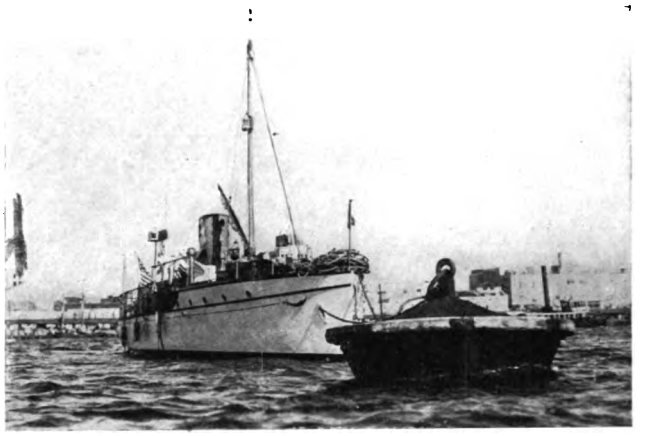
At quarter to five we started from the Sea Buoy and at once Caliph and Berneyo sped away from us and were soon out of sight. We headed Ilys for some time, she holding on our quarter, but at last she got her engine going and went by and away ahead. Ilys ran in the most erratic manner; at times we held her for hours and again she would leave us. At 6:50 p. m. we passed American Shoal, and at eight o'clock Sombrero was abeam. With a strong current we were making fine time over the ground. Just before we reached Alligator, Caliph slowed down, dropped back, and we passed her. The next morning she passed us again and went ahead. At noon by the chart she was not far North of us. Ilys we saw all day. The weather beautiful, hot, with a good breeze that helped considerably. At noon we were off Palm Beach, just out of sight of the coast, and had made 192 miles in 19 hours. At 4 p. m. a Morgan liner passed inside of us and spoke Ilys.

Contrary to the general opinion, the Stream runs strongest on the Western edge and not in the middle, and Ilys, Caliph and Caroline kept over that side. Besides it was best to keep over there in case of a heavy Northeaster, as it would be necessary to haul out into the cold water to escape the sea.

Tuesday, June 7th, began with rain-squalls, and we were obliged to take in sail. At 4 a. m. it cleared up and we hoisted the rags again. The wind was light Southeast and the sea smooth, the boat was going fine. At 6 a. m. saw Berneyo off starboard beam, she having dropped behind for some reason. Ilys was off to port about three miles. This day at noon we had made over 260 miles; much of this was current. At 1 p. m. what I expected but did not want to see, came—a heavy Northwest squall. This is a sure sign of a change of wind and usually a Northeaster. It was a fierce one, lightning, wind and rain enough to drown a man standing up. This settled the Southerly wind and I began to edge the



Crowd Watching the Yachts in Habana Harbor



How They Moored Us at Habana

boat in toward the soundings. At five o'clock we struck a lead of cold water, with rips and a very strong current. At 8 p. m. Ilys crossed our bow; heading N.E. by E.; we were headed N.E. At 2 a. m. the Northeaster struck in and began to blow hard. This settled our chances and the boat dropped to less than six knots.

In the first watch the chief engineer came on deck and said that he was having trouble with the carbureter owing to dirt in the gasolene, and asked to keep the boat from pounding, which she did every time she caught two steep seas. This pound caused the engine to slow up, it being a gravity feed from the main tanks—a very bad system for going to sea with. All these engines should be fed from an auxiliary tank directly over the carbureter, then there will be no trouble of the kind. The carbureter was old, and worn out. In order to keep the boat from pounding I kept her off a point either way for four hours and this eased her up and she made better speed. By eight o'clock it was blowing a stiff breeze and despite the best the poor little engine could do we were not making more than five. A tramp loaded with lumber, called Fenimoor, came by and her officer tried to wigwag us, but nobody knew the code and we had no signals aboard, so could not understand or answer him.

All day long the Northeaster kept up and we did the best we could, keeping plugging into it. Everything aft was soaking wet, owing to decks leaking and letting the rain run through on the bunks, and on deck it was far from comfortable, being raw and chilly after coming out of the hot weather.

At four o'clock I put the boat on a N.E. by N. course, which would bring her half-way between Lookout Light and Lookout Light-Vessel, and went below for a snooze with orders to call me at 6 p. m. At eight I woke up to find somebody fussing with the charts in the cabin; on being asked what he was after, he reported a white light on the port bow. This was Lookout, and if any lookout had been kept on deck they would have seen it an hour before.

It is one of the most difficult things to impress upon a crew the necessity of a good lookout. Unless you are constantly on deck and after them they neglect it and will pass close alongside of the very things you are looking for and never see or report them. The best lookout we had was one of the Maryland boys, who always had his eyes open and saw more things than all the rest put together. We were in sight of the Cuban coast for over an hour before some of the crew saw it, and then only after they were told it was there.

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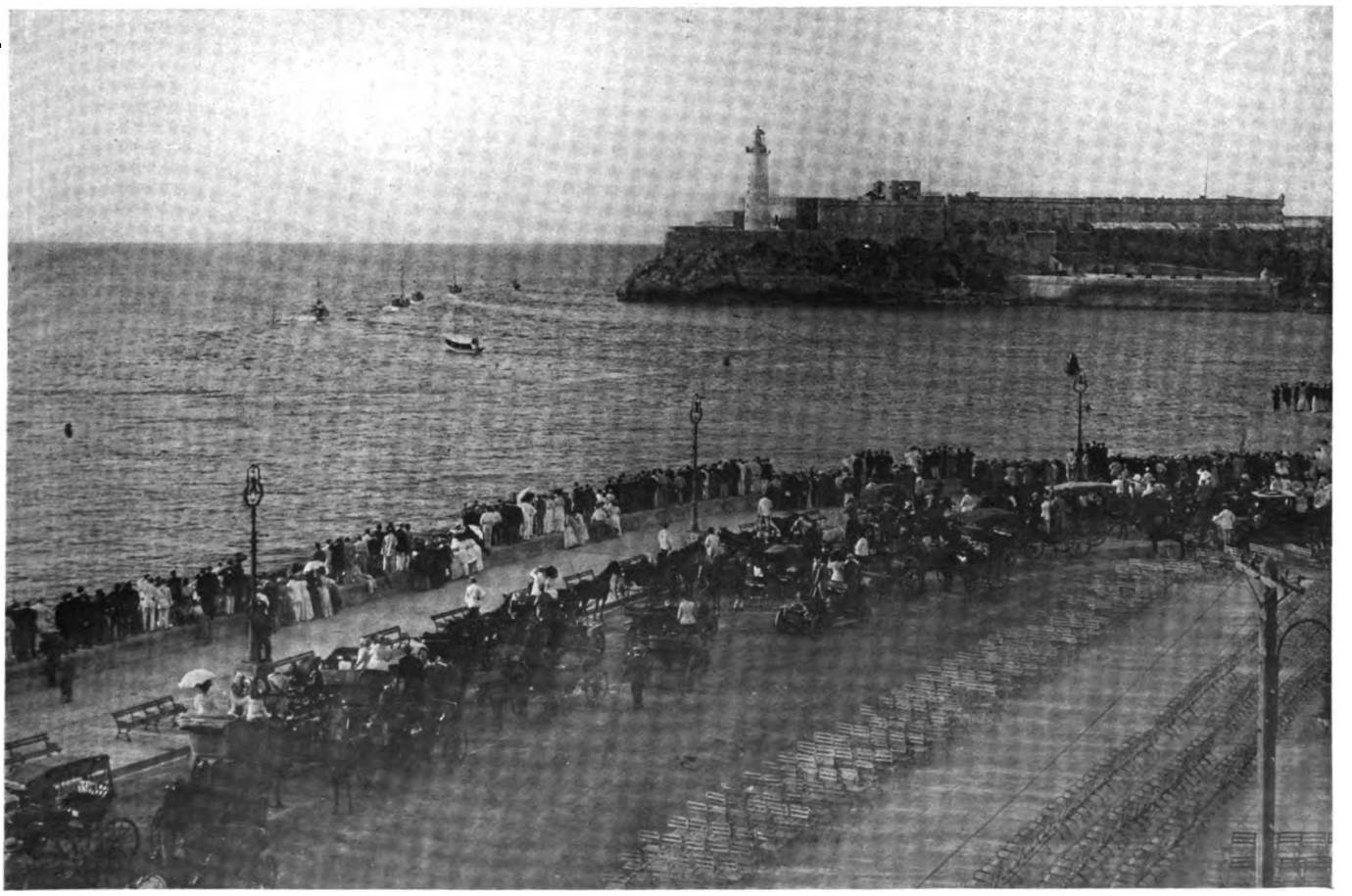
The engine was now running badly, owing to the dirty gasolene, and the Chief said it might stop at any time, so having passed inside the Light-Vessel took a departure and determined to steer a course to give Hatteras Shoals a wide berth. The wind was S.E. and if we broke down with the shoals right under the lee there would have been trouble, as we only had one small patent anchor that would not have held her in a break for ten minutes. The extra anchor which was supposed to be stowed in the forepeak turned out to be a myth.

At 6 a. m. the engine stopped. At this time we were about ten miles from Diamond Shoals, the Light-Vessel, according to my reckoning, bearing North by East. From this time until 8 a. m. we drifted; the engineers working at the carbureter without any success, although we had turned on some clean gasolene. At last the Chief came up and reported that the carbureter was past repair, and that he could do no more. The spare carbureter, which, according to conditions, should have been on board, could not be found, and the blame for its not being there was placed on the shoulders of the man ashore, who couldn't answer back. This was a nice fix. No port under the lee; in fact, no port for 100 miles, about two days' food on board, a strong S.E. wind blowing, and thick weather, and we were all sick and tired of the boat and only anxious to get off her. A little after eight we sighted a fruit steamer bound South and thinking she had wireless on board spoke her to ask her to report us broken down, so we could get something to come out and tow us in. She would not come near enough to hear and after a while launched a boat and three men, who came alongside. She proved to be Kathie, a Norwegian bound to Jamaica for a cargo of fruit. They had no wireless on board, and the Captain declined to tow us as he was in a hurry to get to his port, where a cargo was waiting. He very kindly offered any other assistance. I asked the man in charge of the boat the bearing of Diamond Shoals, and when he came back to report the Captain's reply, he gave it as N. by W., ten miles.

After the Norwegian left us there was nothing to do but get sail on and try and drift the boat up to the Light-Vessel and hang on about there until help came. It would have taken a week to have sailed her into the Capes. As soon as sail was made and we had squared away, the pressure started the propeller moving, and the assistant engineer having inadvertently put his hand over the air inlet the engine sucked on the carbureter, drew out the offending substance, and the engine gave a few bad coughs and started up. By this nonsense we had lost over four hours.

At 9:50 we passed Diamond Shoals close aboard and headed for Winter Quarters. All day long we ran with a strong S.E. wind, making fine time but our troubles were not yet over. At midnight the weather went calm again with shifts of wind, and then it settled in to blow N.E. and we dropped back to our old six-knot gait. At 3 a. m. passed close to Winter Quarters and a battleship. Altered course to steer direct for Atlantic City. At 7:20 passed Fenwick Light-Vessel. At 12:30 sighted two inner buoys on Five-Fathom Bank. Wind blowing strong N.E. and raining. Gasolene giving trouble and engine not working well. About 4 p. m. saw Atlantic City ahead indistinctly through the rain; at 5:08 crossed the line.



The Fleet Off for Home

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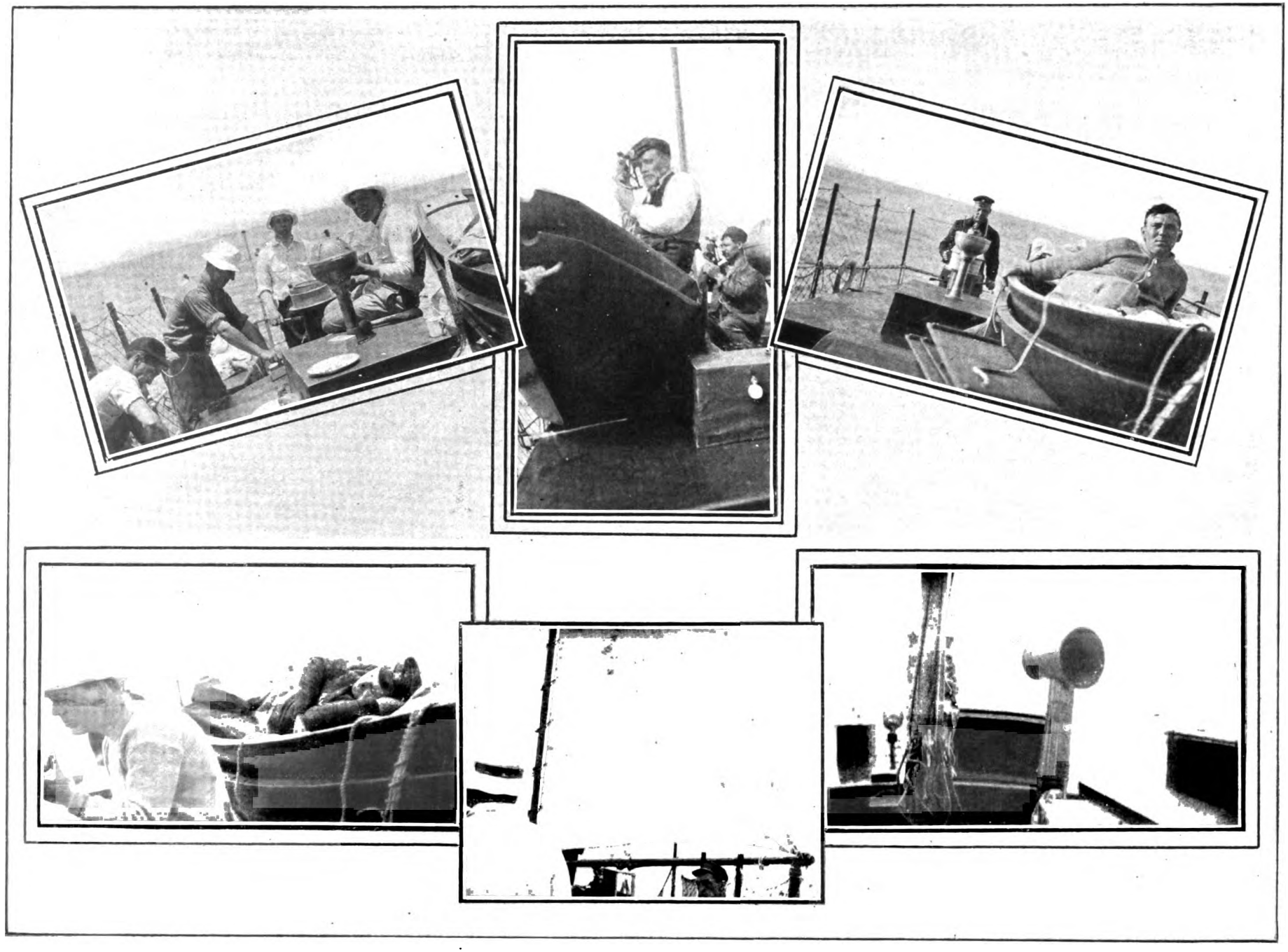

Snapshots Aboard Ilys in Habana Race

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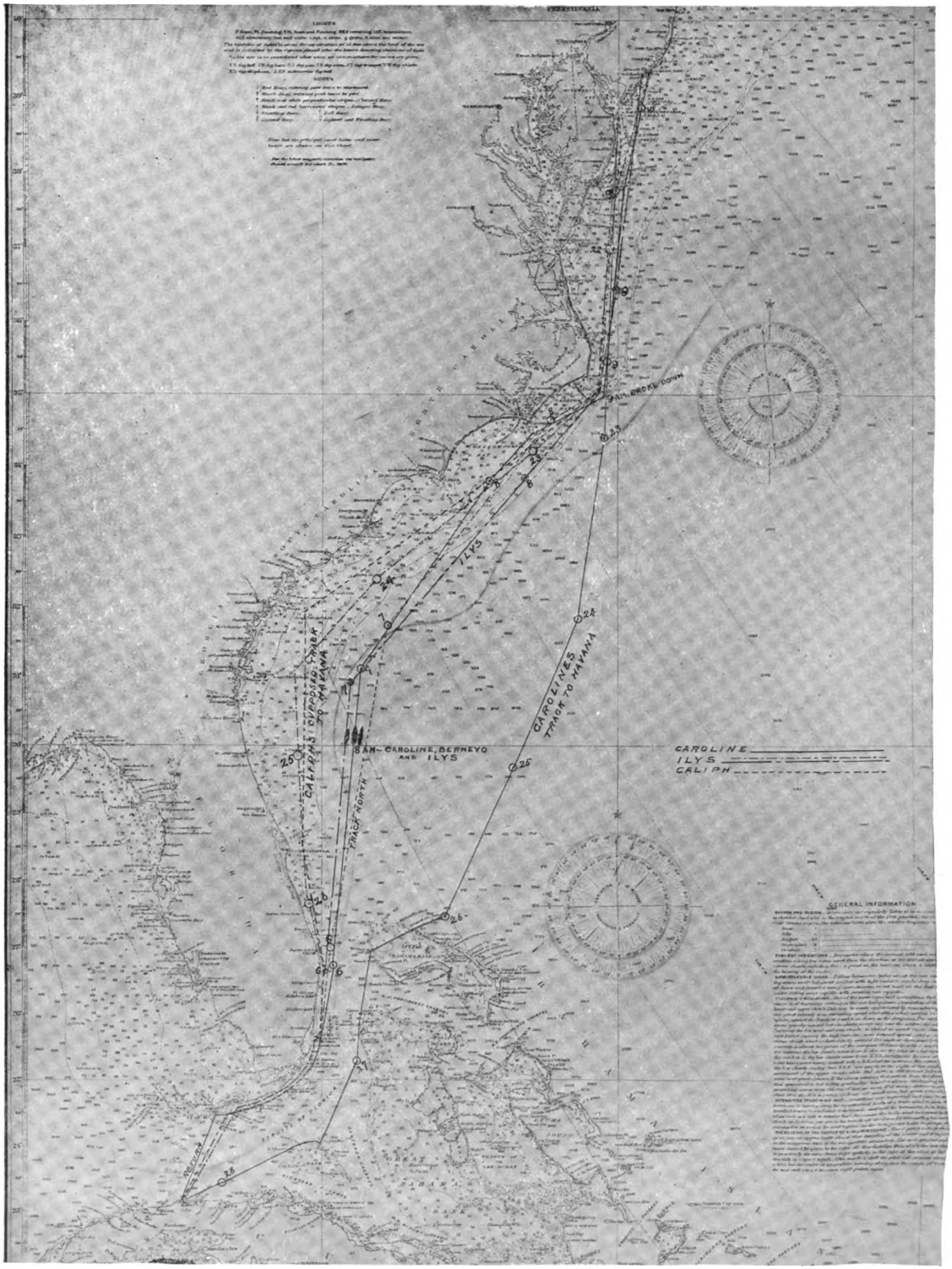

Chart Showing Courses of Yachts in Philadelphia-Habana Race and Return Race to Atlantic City

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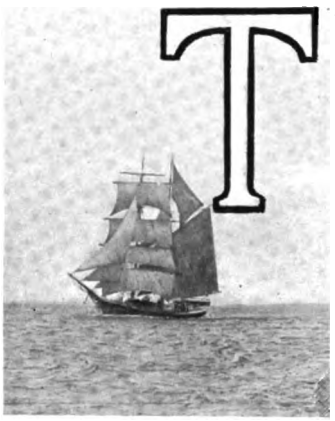
RUDDER CUP RACE AT DUNEDIN, N. Z.



THE Otago Yacht and Motor Boat Club is located in Otago Harbor, the port of Dunedin, New Zealand. This harbor is on the East side of the South Island in latitude 46°. The course for the race was laid outside the Heads, as the two points at the entrance of the harbor are called, and was North to and around a stakeboat off Oamaru. The race started on Christmas Eve was broken up by a heavy gale and several of the boats were damaged. The race was started again January 15th, and was successfully sailed in light weather. The account of the race is taken from the Dunedin *Evening Star.*

THE OCEAN YACHT RACE

The Ocean Yacht Race for THE RUDDER Cup over a 100-mile course from Otago Heads round a point six miles North of Oamaru and back to the Heads, was started at 3:30 p. m. on Saturday and was finished Sunday. Iorangi finished first, Carina second, and Roma third, and their handicapping under the international yachting rules did not interfere with their being placed in that order. An attempt to sail the race on Christmas Eve was frustrated by bad weather.

THE START

The race started from a line between the flagstaff at the Otago Heads signal station and the light on the end of the adjacent Mole. The weather was fine; the sun was shining; the wind was fair—a 5-knot breeze; the sea was smooth save for a scarcely-perceptible ground swell from the South. The course lay almost due North. Seven yachts started. Myrtle got away first, followed by Pera, Carina, Iorangi, Petrel, Roma, and Annis, in that order. Annis started close under the lighthouse cliff, where the wind was unsteady, and when she got away she stood well out to seaward of the other yachts. Iorangi, steering a course to clear the outlying reefs at Shag Point, gradually drew ahead of the others.

Particular states of the wind and wave would give each yacht an advantage over her rivals. The desired states of the weather were as numerous as the competing yachts. Iorangi was scratch boat; a breeze that kept her lee covering board within a foot of the water would win her the cup. She is 52 feet long over all, and rough water would inconvenience her less than the others. Roma, next in size, is 36 feet long, and medium weather

Iorangi Crossing the Finishing Line and Winning the Rudder Cup

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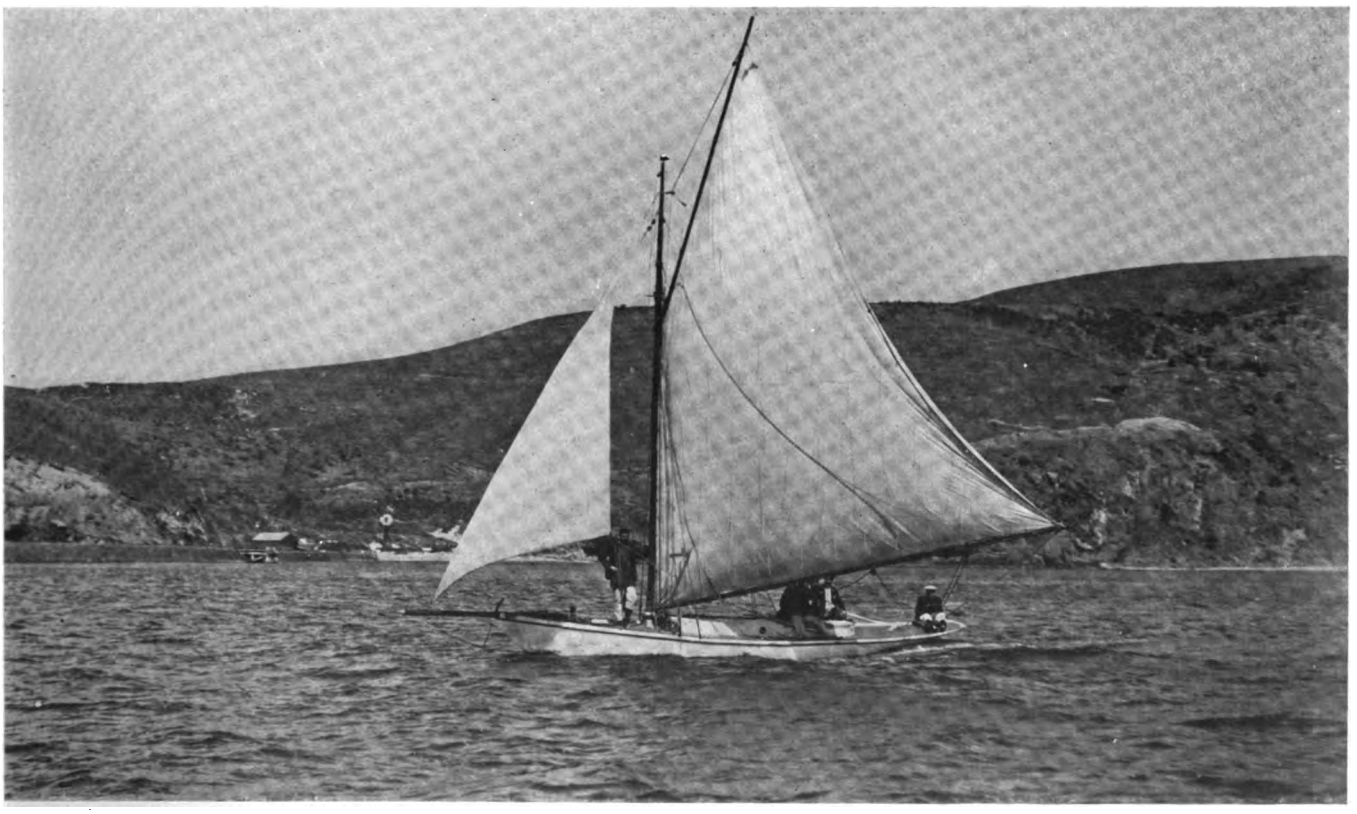
would best develop her speed. Annis, a high wooded boat, and built more on cruising than racing lines, was 2 feet shorter still. She beat back to an anchorage under full sail against the burster on Christmas Eve. Carina, a light-weather craft, had 1:46:03 handicap from the scratch boat, and judging by harbor spins would do well in smooth water. Petrel, as a model, is about halfway between the modern cut-away and the bolder full-length keel types of racers. Her crew had outside experience, and a single-reef or stronger breeze would favor her. Pera and Myrtle are of the old long-keeled type of boat, and if speed were not their greatest merit, they would be the safest boats to be in under heave-to conditions. It was difficult to forecast what conditions would prevail ere the 100 miles were traversed. Every yachtsman was hopeful, did his best, and left the result to the weather.

Well Underway

An hour after they started the yachts were off Waikouaiti Bay. Iorangi was leading by upward of a mile. Next came Carina, well ahead of Roma and Petrel, which were near each other. Pera and Myrtle were keeping offshore to strike the northerly offshore current, the latter boat now being outside Annis. These last three boats were close together. The wind was still Northeast, and the yachts were cracking on every stitch of sail, so as not to lose a capful. Spinnakers were set as balloon jibs, and spare sails spread from the main-booms to the deck. As an additional means of forcing progress, Petrel had a staysail set forward of her jigger. She was the most picturesque boat of the fleet. At seven o'clock Iorangi had traveled 17½ miles, and was off Shag Point. Carina was about two miles behind her, and a mile further back the other yachts had not materially altered their respective positions, except in the case of Roma, which had drawn further ahead into third place. The ground swell was more pronounced, but it was not sufficient to suggest "climbing" on the part of the smallest yacht—just enough to show that the course was not flat.

The wind died away as the night approached, and darkness enveloped the straggling line of yachts ere slipping shoreward in the wake of the departed sun and erasing the hill-jagged skyline. The coast-line vanished; the gleam from Moeraki lighthouse away to the left and Oamaru lights away ahead were all that was visible, save the red and green side-lights of the yachts peering into the darkness. The quietness was broken only by the flapping of empty sails and an occasional prowling call from night-birds fishing away out toward the invisible horizon. The night was still. Yachtsmen on watch were thrilled with the gladsome awe and fascinated by the inspiration of the night-draped Summer sea. It was an experience apart from the workaday world of the impatiently-ticking clock. After 3 a. m. the darkness seemed to lose its substance, then gradually dissolve. Returning animation woke the seagulls on the distant cliffs, and, wheeling forth in response to the sentinel's shrill heralding of the dawn, they winged seaward to relieve the fishers of the night. By and by the sun peeped over the horizon and flooded the sea with rosy light. The sea cliffs were burnished into relief ere the sunrays sped inland and lifted the dewy mists in shimmering wreaths from the hilltops. The dreams of the night now gave place to the duties of the day.

The yachts that kept offshore to pick up the Northerly current were becalmed for eight hours. The ones nearer the shore got an occasional catspaw from the right direction. At half-past four o'clock in the morning Iorangi was about four miles North of Oamaru, Carina and Roma about the same distance to the South; the other



Carina, Winner of the Second Prize

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yachts were not in sight. There was the merest breath of Southerly wind. Iorangi rounded the turning boat at 5:40 a. m., Carina at 8:40 a. m., Roma at 8:55 a. m., Annis at 11:17 a. m., Petrel at 11:37 a. m., Pera at 11:42 a. m., and Myrtle 24 minutes after noon. On rounding, Iorangi stood in for Oamaru Breakwater, near where she was becalmed till after nine o'clock, when the wind came in from the Northeast. Carina and Roma were about four miles behind. The breeze brought up the other yachts.

The Defence steamer Lady Roberts was placed at the disposal of the Otago Y. C. officials for the purpose of supervising the race and rendering assistance should any mishap overtake the yachts. The club officials on board were Vice-Commodore Moller, Rear-Commodore Smith, Committeemen A. Bedford and N. Oliphant. They speak in flattering terms of the courtesy of Captain Cashman and his crew. The patrol boat arrived at Oamaru at 9:45 p. m. She subsequently went North to Pukeuri Point and took the place of the fishing boat acting as turning-buoy. When the yachts were all on their way home she returned to Oamaru, and when she was leaving the wharf at 1:30 p. m. three cheers were given for Captain James Ramsay, who had rendered valuable service to the yacht club in arranging for and personally taking charge of the boat that did duty as turning-buoy for the yachts. On her way home Lady Roberts took in tow Myrtle and Annis, Pera and Petrel declining similar proffered despatch. The wind changed to Southwest—a nice full-sail breeze—at 2:30 p. m., and the yachts had then to beat back to the Heads. Lady Roberts reached the Heads at 8:25 p. m., about which time Carina and Roma were finishing the race, Iorangi having finished about four hours earlier. There was no mishap of any kind during the race, which resulted:

Iorangi (Scratch), 25h. 2min. (actual time)..... 1
Carina (1:46:03), 29h. (actual time)..... 2

Roma, with a handicap of 1:03:36, completed the distance at 8:50 p. m.

Messrs. C. G. Smith and E. C. Hazlett started the race, while Messrs. Wheeler, Warren, and Hazlett remained at the Heads all day to take the time.

All the boats have arrived, the last to cross the line being Pera, at 6:45 this morning.

HON. SECRETARY'S LETTER

At last the much-talked-of RUDDER Cup Race has been sailed, won and lost. I can assure you that this race has taken a great deal of attention. You will remember that the race was postponed from Christmas, 1908, owing to the non-arrival of the cup. Last Christmas, however, we had the cup, but didn't have the race. Nine of the best boats entered and were all on the mark to time on Christmas Eve, 1909, at 7 p. m. Just on starting time down came a howling Sou'wester. With a lifting white squall accompanied by rain, nine yachts with topsails and all confined in a small space, you can imagine what trouble the yachts were in. Owing to this squall the yachts never heard the starting signal and all struggled back the best they could, with the exception of Pera, who carried away her mast. I enclose you a copy of the *Evening Star* dated December 27th, from which you will be able to gather any further information. Nothing daunted, arrangements were made for the holding of the race on January 15, 1910, over the same course. This time the conditions were exactly the reverse of Christmas Eve. All the yachts came to the mark with the exception of Yvonne, who could not wait and had to return to Lyttleton. From beginning to end the race was a success, only more wind would have made things much more interesting. An hour after Iorangi had passed the Oamaru turning buoy it was anybody's race, the yachts all being within two hours of the scratch yacht. That is, of course, provided a breeze came to hand. Such was not the case, however, and Iorangi went slowly home, followed by Carina and Roma. And

Roma, Winner of the Third Prize

The Start of the Rudder Cup Race, Myrtle Leading, Pera Second

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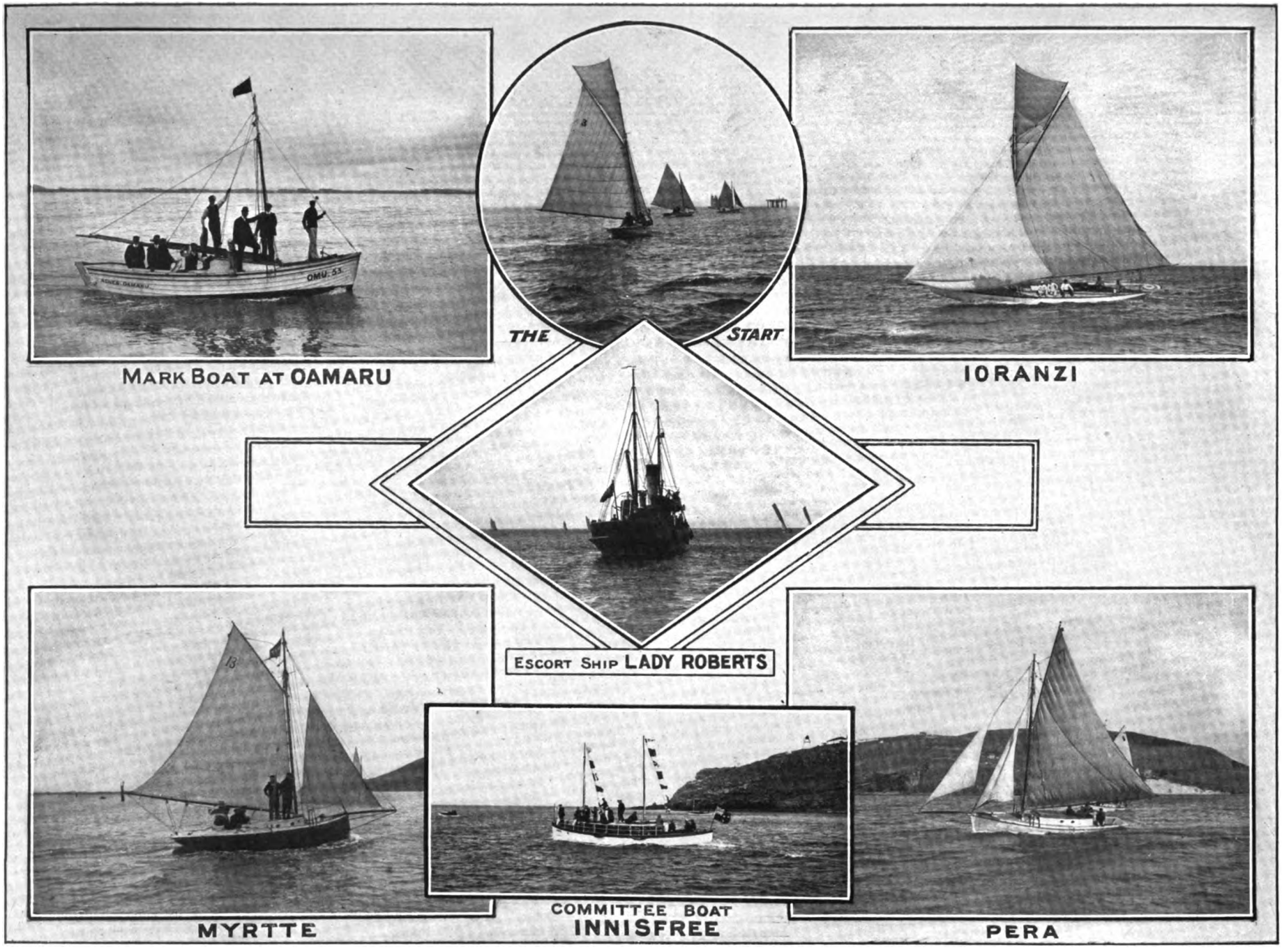

Scenes at the Rudder Cup Race at Dunedin New Zealand

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thus ended the race for THE RUDDER Cup. But, Mr. Day, you have not the faintest idea of the amount of good you have done to yachting in Otago Harbor. This race was the talk of the town. Even now it is on the cards that an excursion will be made by the local yachts to Oamaru at Easter. It is proposed that a race to Oamaru should be held and the launches are also being asked to cooperate. This is caused solely by your generosity and sportsmanship, and I am sure you will feel thoroughly compensated. To be in the "fashion" now, a yachtsman must do "outside" sailing. By this race the club has discovered a number of good friends, notably Captain Cashman, Lady Roberts, and Captain Ramsay, Oamaru. Without the aid of these gentlemen we would have in all probability been in a bad way. I am enclosing you the newspaper accounts of the race, which are fairly accurate, and also the photos taken during the race. These photos are the best I have seen for a long while, and no doubt you will find them useful for your publication. On behalf of yachtsmen throughout the Dominion, and the Otago Y. C. in particular, I must again express to you our heartiest thanks for your great interest and substantial sympathy which you have displayed to yachtsmen at this part of the globe. I am sure that the good work you have started by the introduction of your cups will be kept going. From time to time I will drop you a line or two as to how the great sport is progressing.

CHAS. D. KEEGAN, *Hon. Secretary,*
Otago Yacht and Motor Boat Club.

LOG OF CARINA

100-MILE OCEAN RACE FOR THE RUDDER CUP, JANUARY 15, 1910.

Carina, 7.73 metres. Handicap, 63.64 sec. per mile.

Crew.—J. Robertson, skipper; J. C. Duncan, J. F. Sinclair, H. McRae, A. French, D. Timlin.

The starters were:

Boats	Metres	ALLOW. H. M. S.
Iorangi	10.4	Scratch
Roma	8.65	1:03:30
Annis	8.06	1:29:03
Carina	7.73	1:46:03
Petrel	7.62	1:51:54
Matua	7.33	*
Pera	7.18	2:15:24
Myrtle	6.39	3:05:39

*Did not compete.

January 15, 1910.—11:30 a. m., left moorings at yacht club, Dunedin. Lovely day. Wind S.E., full-sail breeze. French, McRae, Sinclair, and myself aboard. 12:25 p. m., arrived Port Chalmers. Procured and stored provisions and water for the race. J. Duncan arrived by train from town. 1:30 p. m., pulled out from wharf for the Heads. 2:30 p. m., D. Timlin stepped aboard from power launch. Crew all aboard, everything stowed, all ready to start. 3:01 p. m., arrived starting line. Wind considerably lighter. Pera, Myrtle and Petrel only boats on time to start. Start delayed for the non-arrivals, Iorangi, Roma and Annis. 3:15 p. m., quarter hour flag. 3:25 p. m., 5-minute flag. 3:30 p. m., starting gun gone. Beautiful start; got away third, Pera and Myrtle in the van, Iorangi fourth. Iorangi soon took leading position. Carina second, which we held throughout the race. Course N. by ½ E. 4 p. m., set balloon jib. 5 p. m, abreast Jones Head. Defence steamer Lady Roberts passed. Cheers exchanged. 6 p. m., tea served. My first meal since eight o'clock this morning. The water for the tea was boiled on top of a spirit stove placed in a bucket with the *billy* or kettle on top; the bucket was then hung up so the motion of the boat did not affect it so much. It worked all right, only the trouble was to put the stove out. It was so hot that it had to be blown out in the bucket, you could not get your hand down to lift it out. 7:05 p. m., abreast Shag Point. Wind dying away. 8:15 p. m., abreast Moeraki Light. Put out side-lights. Roma close astern. She came up to us in the light air. Petrel and Annis barely visible. 10 p. m., served grog. 10:15 p. m. Hot Bovril.—Archie French in blowing out spirit stove got a good mouthful of half-burnt spirit vapor; result, a dash for the side—waste of good grog. Stowed balloon jib. 10:30 p. m., sighted Oamaru Light. All hands, except McRae and myself, turned in. No wind; very light airs occasionally.

Jan. 16.—4:40 a.m., sunrise; cloudy morning. 5 a. m, abreast Oamaru. Iorangi ahead. Roma astern, only boat in sight. Dead calm. 6:55 a. m., Iorangi passed returning; exchanged greetings. 8:04 a. m., Roma coming up with light air. 8:40 a. m., rounded turning mark, Lady Roberts. J. Duncan succumbed to seasickness. Wind E., very light. Set balloon jib. Iorangi inshore about 8 miles ahead. Laid course S. by ½ W. for Otago Heads. Worked well offshore to get N.E. breeze first if the wind shifted that way. 9:12 a. m., passed Oamaru fishing boat Agnes; noticed Otago Y. C.'s popular Rear-Commodore McC. Smith aboard. Best wishes for a good trip home. 9:15 a. m., abreast Oamaru. Breeze freshening from the E. Breakfast served. All hands dodge the spirit stove except Dave Timlin. No wonder—I had a whiff of it. 10:10 a. m., passed Annis and Petrel sailing N. inshore from us about 2 miles. 10:25 a. m., passed Pera and Myrtle. Breeze fresher. Yacht doing about 7 knots. 10:40 a. m., Iorangi inshore about 6 miles ahead. 1:05 p. m., abreast Moeraki Light. Wind falling light; head sea. Yacht taking water over the rail forward. Doing about 2 knots. Big jobble. Scene on deck—McRae steering, French, Timlin and myself all right. Jacky Duncan prostrated with seasickness, lying on top of hatch. Plum Sinclair, who has been having a spell below, suddenly appears with the remark, "Feeling sick, chaps." He was quickly advised to "Hang on and get rid of it." By the way, Plum had never been sick before; thought he couldn't be sick and didn't forget to tell us either. After Plum had straightened his back, he looked round and remarked, "Can't be sick, only half a mouthful." But Jacky had been watching, and the reply came quickly, "What a h—l of a mouth you must have, Plum." 6 p. m., abreast Jones Head. Wind S., full sail. Lee rail under. Dead beat to finishing line. 8:15 p. m., Lady Roberts crossed our bows with Annis and Myrtle in tow. Speed launch Kelvin sighted making in Otago Heads. 8:19 p. m., crossed line. Captain Cashman of Lady Roberts kindly waited and took us in tow.

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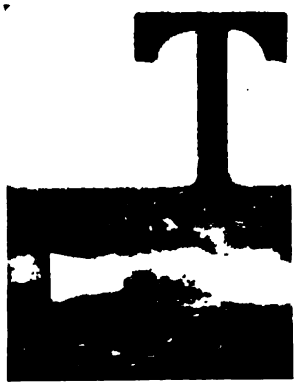
WEARY OF THEORY

Albert Hickman



THE RUDDERS for this month were lost on their way to this district and I did not get mine until to-day—May 21st.

I read Mr. Malby's article with great interest, but I had some difficulty in gathering its import, so I read it over again to Cockawee's cook. He said: "I think he's mad with himself because he understands why Viper does things, and you don't." That is doubtless the explanation.

Mr. Malby says I know no theory. I admit the justice of the impeachment. In the face of such theory as he presents, and presented as he presents it, I am as a babe unborn. He uses abscissa to plot with. I hardly remember what abscissa look like; but I have a keen recollection of what an elaborately designed boat looks like chasing a Viper round a course. It looks like the last rose of Summer.

However, through the mercy of Providence, I know Froude's law, knew it before Mr. Malby elucidated, and I know that it has no more bearing on a high-speed engine boat of the glider type than the Ten Commandments have on a gyroscope.

His personalities I can forgive; they are the last resort of one mentally heated and distressed; but his misquotations of my articles are unforgivable. If Mr. Malby were a trained controversialist, he would know that to misquote your adversary weakens your argument more than any other one thing you can do; because it makes it so evident to your audience that if you are willing to pervert anything as accessible as your adversary's article, you would be glad to make any sort of statement that might seem to you to strengthen your case.

This is the sort of thing. In his second paragraph Mr. Malby says: "He says she does not pound," the "he" meaning me.

My article says: "In Viper, pounding in a moderate chop has not been eliminated, but it has been our experience that she does not pound destructively." That is to say, Mr. Malby's statement is deliberately untrue.

Also in his second paragraph Mr. Malby says referring to me: "First he wants us to discard all the boats of regular form and substitute his boat, and then he goes on to justify the substitution because he claims to have found a hull of least resistance." This statement is Mr. Malby's own personal invention; and this is the man who begs me to be accurate.

Let me consider for a moment the part of his article that might be sincere. His "boat" with which he compares Viper is, by his own admission, a 5-foot model towed in a tank. Now while tank models, under Froude's formula, have furnished remarkably accurate data for the construction of vessels where the problems have been purely problems of displacement, it has been gradually borne in upon us that such data are of no value when applied to high-speed gliders running under their own power. The precise conditions that exist under the bottom of a glider at speed are largely unknown, and are to be learned only by much experimenting. In this way, the laws that "govern" them will gradually be formulated. In the meantime, Mr. Malby and his ilk should have common sense enough to wipe out the laws that apply to displacement craft and start with a clean slate. Instead, he shows the ancient pseudo-scientific tendency to wind himself into the gray hair of any existing formula and to look upon anything he does not understand as an exception to the rule. As Mr. Day so impersonally put it: "Science linked with mediocrity too often wastes its efforts in the depths and declivities chasing inconsequential shadows."

Any high-school pupil could have resolved the shaft thrust into its horizontal and vertical components. This sort of pedantry is very impressive, but it is not nearly so impressive as the fact that a boat with Viper's bottom was built to weigh less than half as much as Viper II, and that with her engine installed further forward and with considerably less shaft-angle than Viper's she ran with her nose in the air and a mile and a half slower than did Viper. In any case, in this resolution, all Mr. Malby's original assumptions are unwarranted. He does not know what percentage of power is applied in the direction of motion. Perhaps a properly proportioned Viper has no "critical speed." She is either never a glider or always a glider. Even when carrying a light bow wave at low speed, she shows the characteristics of a glider, and her rise is gradual. At all times she is sensitive as to trim and a comparatively light upthrust of the shaft would tend to alter the trim in a marked degree.

After I had read Mr. Day's adversions I felt tempted to let Mr. Malby drown in his own tears; but the prospect of laughter was too alluring and I came on. It is this kind of man, who blends discourtesy and dogmatism, that makes the intelligent discussion of this sort of question impossible. He said he had intended to follow through my article and pound, pound, pound. He did. He pounded like a garbage scow in Hellgate. Why doesn't Mr. Malby go down to Bath and get Mr. Bacon to take him for a run in a Viper in the open air. He would forget his sore, round bilges and find that the little stars in heaven were twinkling as they used to twinkle in the days of long ago.

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HURRAH'S NEST

"A Place for everything and nothing in its place." Letters for insertion under this head are limited to two hundred and fifty words, and must be accompanied by correct name and address of writer. Address the Hurrah's Nest, care Editor THE RUDDER, 1 Hudson St., N. Y., U. S. A.

SCIENCE AND PRACTICE

I HAVE read with some interest Mr. Seth G. Malby's article in the May RUDDER, entitled by Mr. Malby "Weary of Practice," in which said Mr. Malby says, among other things, that "It was his intention first, to follow through with (Mr.) Hickman's article and pound, pound, pound, but that he will leave this to the reader," etc. Now, as one of the aforesaid readers, I do not want to shirk my fair share of the responsibility so pleasantly handed to me, and while pounding—or as might appear to the unscientific mind, just plain knocking—is perhaps not my long suit, I will, in the performance of that duty, attempt in my feeble way to do a little of that "pounding" which Mr. Malby's evident consideration for Mr. Hickman, as well as his own innate modesty, caused him to delegate to his readers.

I have read Mr. Hickman's writings in your valued magazine with interest, and found therein much that appeared to be informing, and it was with quite a shock that I discovered later from Mr. Malby's article that it was all a mistake and that "$\frac{V}{v} = \frac{\sqrt{L}}{\sqrt{1}}$" and "assuming that 60% of the power is applied in the direction of the motion" (a really safe assumption that I am not prepared to disprove), "then $R = \frac{12 \times 550 \times .60}{26.4} = 150$ lb," and that because of all this that I had really learned nothing at all, and that Mr. Hickman, although he had "made a good boat in spite of his blunderings" and had unselfishly given us all the benefit of his experiment and observations, was very much to be pitied and ought in a due spirit of humility betake himself to a study of "Taylor's" and "Durand's Resistance of Repulsion" and Lancaster on Aerodynamics, with which we were all more or less familiar in our adolescent age. I can't see why Lancaster's Aerodonetics was not mentioned as well; it's a noble big name that most sailors would have to look in a dictionary to find the meaning of. Froude is all right and "abscissa" is another good word; certainly any one should be ashamed to mention such an unscientific thing as manufacturer's horsepower rating in such learned company; but why stop there? Why not call in Watson, and Fyfe, and Clayton, and Payne, and Sibbick, and Hope, and even Dixon Kemp? He comes in two volumes, either of them too large to hold in comfort.

But seriously, to the average boat lover, Mr. Hickman's article is a valuable writing. I wouldn't take five dollars for my copy of THE RUDDER containing it if it could not be replaced, and it will be the means of influencing a number of people to build fast boats at small cost, and these, in turn, will call out something better. In fact, the information contained in this little article is even now selling for five dollars whereas I very much doubt if its able criticism, valuable in some ways though it be, could be successfully marketed for the proverbial thirty cents; and by the same standard of values this little effusion of mine ought to be worth just about one cancelled postage stamp of the one-cent variety. But there may be other Mr. Hickmans coming along in the future just as there will be other Mr. Malbys, and I don't want the readers of THE RUDDER, of which I hope to be one, to be deprived of the benefit of what these future Mr. Hickmans may have to tell, from a mistaken notion that all of the people see things through Mr. Malby's eyes. Nothing personal in all this. Mr. Malby's article is all right in its way, it helps to keep our mind on the fact that we mustn't overlook science altogether, in spite of the knowledge that it wasn't so very long ago that scientific minds had no difficulty in figuring out, to their own satisfaction and on the most approved formula, that flying was impossible.

Theory is a good thing; we must all theorize; but practice is better, and all practice *must* have some theory mixed with it; but not all theory will stand the test of practice. If I had to go to sea in a boat, I would rather have a practical crew and captain and cook than a lot of theorists. One would have a better voyage, and stand more chance of getting back safely, and the grub would taste better. Nevertheless, theorists are all right in their place and make for improvement. Far be it from me to decry the scientific naval designer; but if I was empowered to make the punishment fit the crime I would sentence each one to six months in his own boat, in the service for which he designed her,—and it's a safe bet we would soon have more practice mixed with our theory.

Now, dear Editor, or Old Man, or whatever name you like best to be called by your readers, I don't believe this little scribble is worth printing, so if you coincide in this opinion, just pass it along to Mr. Hickman with my compliments, as one average man's opinion, who is not totally unfamiliar with what has been accomplished and is claimed to have been accomplished by theoretical designing.

FRANK A. GARBUTT.

SOLUTION FOR THE PREVENTION OF MILDEW

DISSOLVE 1 lb of borax in 2 gallons of water, and 1 lb of sugar of lead in 2 gallons of water. Allow each solution to stand 10 hours, then mix them together; adding 20 gallons of clear water and allow to stand for five hours. The solution must be agitated thoroughly prior to using. The canvas should be dipped in or thoroughly painted with this solution.

This operation will not restore canvas that *is* mildewed but it will *prevent* mildew. It has been used successfully for twenty years to prevent mildew on sails, awnings, etc.

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THE BARRIER REEF

I WISH to thank your Cooktown correspondent for pointing out that the storm experienced by La Ventura on January 4, 1907, was not the cyclone which destroyed Cooktown.

On arriving at Thursday Island, we were told that on January 4th their barometer readings were the lowest they had been for twelve months. Later, while cruising near the island, we heard of the Cooktown disaster, and not knowing the exact date, supposed it to be the same storm.

Our aneroid barometer was adjusted at Rockhampton on October 15, 1906, but was not tested after the blow, as it was sold with the boat at Thursday Island. I made notes of the barometer readings every fifteen minutes while the storm lasted, the lowest reading being 28.70.

I am sending you a picture of Buccaneer, a Cape Cod catboat, constructed from a design in THE RUDDER, which, with my brother's help, I built for cruising in Puget Sound and adjacent waters. Wee Pup also "looked good to me," so we built one to watch the cat. As Wee Pup has never had her picture taken, I am enclosing a sketch which shows how well she accommodates Buccaneer's crew. The only departures from the cat design were an iron center plate instead of a wooden one, and the installation of a 2½-h.p. Perfection engine.

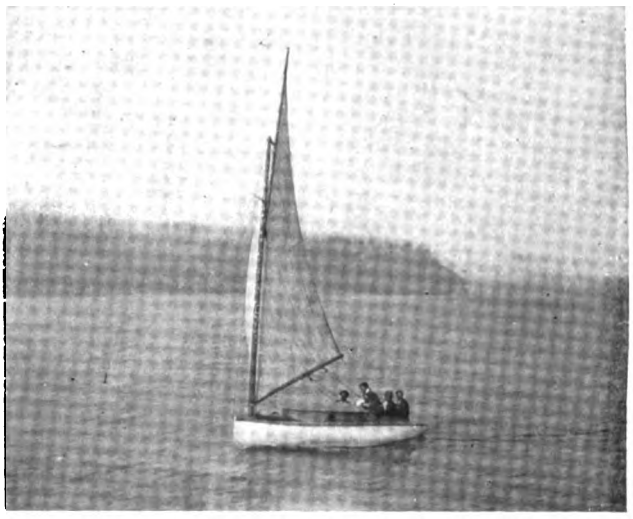
C. H. GOULD.

PATENTED FORMULAS

ON page 418 of the May number there is an article in which it is stated that patented formulas may be *used* without liability, and there follows among other formulas one coming under the *Phenoid* varnish remover patent.

Either *making or using* the subject-matter of a patent without a license is infringement of the patent, and the infringer is liable to three times the amount of the benefit he has obtained, as well as the expense of defending a patent suit. Any reputable patent attorney will confirm these statements. For aiding and abetting such infringements through false statements as to the liability in making and using such varnish remover, you are heavily liable.

Phenoid and other brands of remover under the *Phenoid* patent are for sale throughout the country at a reasonable price. As a matter of fact the selling price of *Phenoid* is lower in proportion to the cost of ingredients than the selling price of most varnishes used in the boat trade. The invention of modern varnish removers has saved millions of dollars to the country and countless hours of hard labor, and is generally acknowledged to be the most valuable invention ever made in the paint and varnish line.



Buccaneer, a Cape Cod Cat Built in Australia

It is a shame that in this country an inventor can reap no benefits from his work without a tremendous expense in enforcing his rights through the court. If this Government protected a patent as in Germany, for instance, patented articles could be sold at a lower price and profit still made.

The *Phenoid* patent is held by strong financial interests, who are not hesitating to defend their rights regardless of expense. We have faith that the readers of THE RUDDER are of a class that will not knowingly infringe patent rights, especially in view of the fact that these goods are sold at a fair price and do the work that previously cost three or four times as much as it now does by the use of *Phenoid*.

Should your article, however, lead to any considerable amount of infringement, we warn you that you will be held liable to heavy damages.

CHALMERS CHEMICAL CO.
H. B. CHALMERS,
President.

[It is, as the Company claims, illegal to make and use any patented formula, and the statement printed in May is wrong.—EDITOR.]

TRIPLE SCREWS

THE following description of a boat in Islip may prove of interest to readers of THE RUDDER, particularly those interested in a light-draught heavy-built boat with ample accommodations for gunning and fishing excursions. While we cannot forward a photo of the interior arrangements, they are so simple that the description will probably answer the purpose.

The boat is the property of Mr. W. W. Clock, of Islip, N. Y., one of the most enthusiastic gunners in the country, and he built this boat according to his own ideas and requirements. The boat is 45 feet over all by 15 feet 3 inches breadth with 32 inches draught. An extreme shallow draught for a boat of this size was necessary to make sailing possible in the Great South Bay.

She was built by Mr. George Bishop, of Patchogue, N. Y., who has a reputation as a builder of boats of this character, and Mr. Bishop believes in solid construction as will be noted from the following details: The keel is of white oak 8 inches by 15 inches; keelsons of yellow

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pine 3 inches by 4 inches, with two sister keelsons of the same dimensions; timbers are white oak, steam bent, 4 inches by 4 inches, placed 12 inches centers forward of the engine room; timbers in engine room are double framed with 4 by 4-inch and 6 by 6-inch timbers supporting engine bed. All timbers are bolted through the keel with galvanized bolts and the deck is supported by 4 by 4-inch columns reinforced by oak knees placed 24 inches; planking is of 1⅞-inch yellow pine galvanized fastened. The decks are of cypress 2 inches by 1 inch thick, painted.

The interior arrangement is exceedingly simple; power equipment is placed aft and is separated from main cabin and pilothouse by a bulkhead. The cabin is arranged with berths on the side and can accommodate six men easily. Underneath the berths are lockers for provisions, wood, coal, etc. There is no galley in the boat, but a full size kitchen range is placed against the engine bulkhead. This not only serves for ample cooking facilities but heats up the whole boat comfortably in the coldest weather. The pilothouse is not partitioned off from the cabin, but forms a part of it. A copper gasolene tank is placed under the forward deck and has a capacity of 175 gallons. Fresh water supply is obtained from two 70-gallon galvanized tanks placed under the deck amidships.

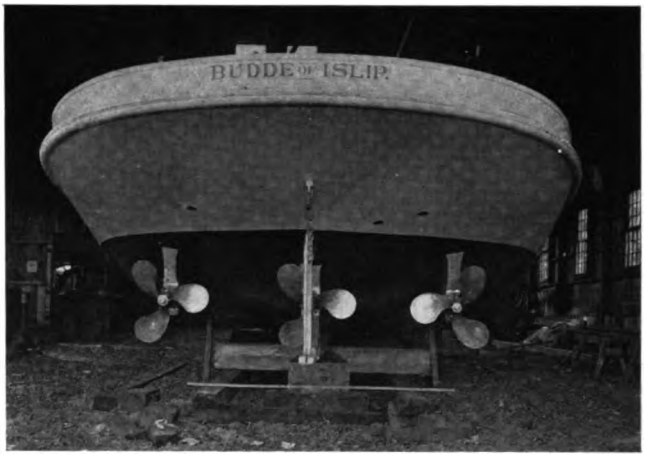
The power equipment consists of three 12-h.p. two-cylinder heavy-duty Kent engines arranged for triple screws. This is probably the only triple-screw equipment on the shores of Long Island in a boat of this size.

The engines develop their horse-power at 300 r.p.m. and have a bore and stroke of 6 by 8 inches, and weigh approximately 1,400 lb. The engines are equipped with two systems of ignition independent of each other, one consisting of the Bosch low-tension make-and-break magneto with magnetic make-and-break plugs, and the other ignition system comprises a regulation coil, timer, distributor and battery system.

A triple-screw arrangement in a boat of this size might be criticized, but the owner had very sound reasons for it. One familiar with the Great South Bay and its tributaries will realize the necessity of a boat with a shallow draught; furthermore, with the winding creeks and channels leading to the mainland absolute control of the boat at all times is necessary for proper handling. It is very essential to proceed very slowly up these waterways, and when this is being done the center engine is used. For ordinary running the two outside engines are put in operation, and when it is necessary to take on a tow the middle engine is again brought into service. It can thus be seen that the arrangement, although seemingly at first to be a trifle complicated, works out to perfection for the purpose for which the boat was built.

TRIPLE SCREWS.

Budde of Islip, N. Y.



View of Stern, Showing Triple Screws

REGULATION OF MOTOR BOATS

AN ACT to amend laws for preventing collisions of vessels and to regulate equipment of certain motor boats on the navigable waters of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "motor boat" where used in this Act shall include every vessel propelled by machinery and not more than sixty-five feet in length except tug boats and tow boats propelled by steam. The length shall be measured from end to end over the deck, excluding sheer: *Provided,* That the engine, boiler, or other operating machinery shall be subject to inspection by the local inspectors of steam vessels, and to their approval of the design thereof, on all said motor boats, which are more than forty feet in length, and which are propelled by machinery driven by steam.

SEC. 2. That motor boats subject to the provisions of this Act shall be divided into classes as follows:

Class one. Less than twenty-six feet in length.

Class two. Twenty-six feet or over and less than forty feet in length.

Class three. Forty feet or over and not more than sixty-five feet in length.

SEC. 3. That every motor boat in all weathers from sunset to sunrise shall carry the following lights, and during such time no other lights which may be mistaken for those prescribed shall be exhibited.

(*a*) Every motor boat of class one shall carry the following lights:

First. A white light aft to show all around the horizon.

Second. A combined lantern in the fore part of the vessel and lower than the white light aft showing green to starboard and red to port, so fixed as to throw the light from right ahead to two points abaft the beam on their respective sides.

(*b*) Every motor boat of classes two and three shall carry the following lights:

First. A bright white light in the fore part of the vessel as near the stem as practicable, so constructed as to show an unbroken light over an arc of the horizon of

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twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side. The glass or lens shall be of not less than the following dimensions:

Class two. Nineteen square inches.

Class three. Thirty-one square inches.

Second. A white light aft to show all around the horizon.

Third. On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side. On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side. The glasses or lenses in the said side-lights shall be of not less than the following dimensions on motor boats of—

Class two. Sixteen square inches.

Class three. Twenty-five square inches.

On and after July first, nineteen hundred and eleven, all glasses or lenses prescribed by paragraph (*b*) of section three shall be fresnel or fluted. The said lights shall be fitted with inboard screens of sufficient height and so set as to prevent these lights from being seen across the bow and shall be of not less than the following dimensions on motor boats of—

Class two. Eighteen inches long.

Class three. Twenty-four inches long:

Provided, That motor boats as defined in this Act, when propelled by sail and machinery or under sail alone, shall carry the colored lights suitably screened but not the white lights prescribed by this section.

SEC. 4. (*a*) Every motor boat under the provisions of this Act shall be provided with a whistle or other sound producing mechanical appliance capable of producing a blast of two seconds or more in duration, and in the case of such boats so provided a blast of at least two seconds shall be deemed a prolonged blast within the meaning of the law.

(*b*) Every motor boat of class two or three shall carry an efficient fog horn.

(*c*) Every motor boat of class two or three shall be provided with an efficient bell, which shall be not less than eight inches across the mouth on board of vessels of class three.

SEC. 5. That every motor boat subject to any of the provisions of this Act, and also all vessels propelled by machinery other than by steam more than sixty-five feet in length, shall carry either life-preservers, or life belts, or buoyant cushions, or ring buoys or other device, to be prescribed by the Secretary of Commerce and Labor, sufficient to sustain afloat every person on board and so placed as to be readily accessible. All motor boats carrying passengers for hire shall carry one life-preserver of the sort prescribed by the regulations of the board of supervising inspectors for every passenger carried, and no such boat while so carrying passengers for hire shall be operated or navigated except in charge of a person duly licensed for such service by the local board of inspectors. No examination shall be required as the condition of obtaining such a license, and any such license shall be revoked or suspended by the local board of inspectors for misconduct, gross negligence, recklessness in navigation, intemperance, or violation of law on the part of the holder, and if revoked, the person holding such license shall be incapable of obtaining another such license for one year from the date of revocation: *Provided,* That motor boats shall not be required to carry licensed officers except as required in this Act.

SEC. 6. That every motor boat and also every vessel propelled by machinery other than by steam, more than sixty-five feet in length shall carry ready for immediate use the means of promptly and effectually extinguishing burning gasolene.

SEC. 7. That a fine not exceeding one hundred dollars may be imposed for any violation of this Act. The motor boat shall be liable for the said penalty and may be seized and proceeded against, by way of libel, in the district court of the United States for any district within which such vessel may be found.

SEC. 8. That the Secretary of Commerce and Labor shall make such regulations as may be necessary to secure the proper execution of this Act by collectors of customs and other officers of the Government. And the Secretary of the Department of Commerce and Labor, may upon application therefor, remit or mitigate any fine, penalty or forfeiture relating to motor boats except for failure to observe the provisions of section six of this Act.

SEC. 9. That all laws and parts of laws only in so far as they are in conflict herewith are hereby repealed: *Provided,* That nothing in this Act shall be deemed to alter or amend acts of Congress embodying or revising international rules for preventing collisions at sea.

SEC. 10. That this Act shall take effect on and after thirty days after its approval.

REGULATIONS

LIGHTS

1. The lights provided for in section 3 of the act above are ***running lights*** for motor boats subject to the provisions of the act in lieu of the lights prescribed, respectively, by article 2 of the act approved June 7, 1897, entitled "An act to adopt regulations for preventing collisions upon certain harbors, rivers, and inland waters of the United States;" rule 3 of the act approved February 8, 1895, entitled "An act to regulate navigation on the Great Lakes and their connecting and tributary waters:" and rules 3, 5, 6, and 7 of section 4233 of the Revised Statutes, governing Western rivers. The penalty for failure to carry such lights is a fine not exceeding $100.

2. The lights provided for in section 3 are not in conflict with the anchor lights, lights for pilot and fishing vessels, and other lights provided in the acts above cited. Thus, the anchor light for motor boats on inland waters will remain as prescribed in article 11 of the act of June 7, 1897, as follows:

ART. 11. A vessel under one hundred and fifty feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding twenty feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least one mile.

Collectors of customs and others will observe that the penalties for violations of existing laws not in conflict with this act remain unchanged.

3. Where lights are carried on motor boats in accord with existing law in excess of the requirements of the act of June 9, 1910, collectors of customs and other officers for the present need not report such lights as violations in order to allow time for the transition to the new lights.

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WHISTLE, FOG HORN, AND BELL

4. No size or style of whistle, fog horn, or bell (except for class 3) is prescribed, provided it is available and sufficient for the use for which it is intended. The word "efficient" must be taken in its ordinary sense, considered with reference to the object intended by the provisions in which the word appears, namely, the production of certain signals.

LIFE-PRESERVERS, ETC.

5. Samples of devices, as substitutes for life-preservers, life-belts, buoyant cushions, or ring buoys, to be prescribed by the Secretary of Commerce and Labor, must first be submitted to the nearest board of local inspectors for transmission to the Supervising Inspector-General, Steamboat-Inspection Service, for examination and approval.

FIRE-EXTINGUISHING APPARATUS

6. No specific means of promptly and effectually extinguishing burning gasolene are prescribed. Besides the usual fire extinguishers, suitable chemicals, or bags of coarse flour or sand, will serve the purpose.

LICENSED OFFICERS

7. Motor boats of over 15 gross tons and over 65 feet in length engaged in the carriage of passengers or freight for hire must be inspected by the United States local inspectors of steam vessels and must carry a licensed engineer and a licensed pilot.

DOCUMENTS AND NAME

8. All motor boats of over 5 net tons engaged in the carriage of freight or passengers for hire must be documented; that is to say, licensed by the collectors of customs. Vessels under 5 net tons are not documented in any case. The license of the vessel obtained from the collector of customs (designated a document) is additional to and must not be confounded with the license required for the operator of a motor boat.

Documented vessels must have name and home port on stern and name on each bow. Tonnage measurement is necessary only in case of vessels requiring to be documented.

While the law does not require it, the Department recommends that the name be conspicuously displayed on undocumented motor boats.

COPIES OF RULES

9. Motor boats are required to have on board two pamphlets or circulars of the rules which must be observed by them, which will be furnished by local inspectors of steam vessels on request.

STEAM VESSELS

10. The change in the law concerning licensed officers of steam vessels will be the subject of a separate circular.

This Act goes into effect July 9, 1910.

ANOTHER RUDDER BOAT-BUILDER

I HAVE been a subscriber for THE RUDDER for four years. I have built one RUDDER boat already, and at the time of writing am working on another one "How to Build a Racing Sloop." I am enclosing you a photograph of the first boat I built from your plans of "How to Build a 32-foot Knockabout," and if I had time I would write you an article on the building of this boat, which was nearly as amusing as some of the other articles which have appeared in THE RUDDER from men who have built from RUDDER designs. I can only say that my boat turned out even better than I anticipated. I now want THE RUDDER to help me a little bit further. My business necessitates my returning to town on Sunday nights, and as the wind sometimes fails, it is absolutely essential that I have a power dinghy to tow me home when I get becalmed. I have procured a 6-8-h.p. double-opposed cylinder engine, manufactured by the Guy L. Sintz Company, at Marshall, Mich., and I have decided to use a Roper reversing propeller of suitable size for this engine, but though I have tried nearly all the regular advertisers of patterns and designs I have utterly failed to find anything suitable for my dinghy. I want a powerful little boat not more than 12 feet long that will not be too big to tow, and will be suitable for landing people on the boat in rough weather. I have looked carefully through THE RUDDER series of books and cannot find anything under this heading, and I shall now be greatly obliged if you will either advertise for me for a suitable design in THE RUDDER, or notify me with whom I can communicate to procure a design of this class. I will willingly pay for the advertisement, or meet whatever expense is necessary for the procuring of this design. There must be hundreds of such boats built, but I am so far out of the boating world here that it is quite impossible for me to get any information except through your publication. I am anxious to get to work on this dinghy in a few weeks from now, and shall be greatly obliged if you will give me the necessary information.

Regina, Saskatchewan. T. T. CUMESHA.

* * *

[See April issue for the power tender.—EDITOR.]

RULE FOR RATING AUXILIARIES

Rating Rules.—The rating for auxiliary yachts will be found from the following:

$$\frac{\text{L.W.L. plus L.O.A., plus square root S. A.}}{2}$$

L.W.L.—Load water-line (length).

L.O.A.—Over-all length.

S.A.—The total working of the area of sails, plus 120 square feet for every unit of horse-power, as measured under the 1909 American Power Boat Association Rules.

The auxiliaries will be permitted to carry light sails, consisting of balloon jibs and spinnaker, which will not be added to the above formula.

No boat with less than 70 square feet of sail area per unit of engine horse-power will be accepted as an auxiliary.

The time allowance for auxiliaries will be taken from the allowance table of the Long Island Sound Yacht Racing Association, as published in their 1909 book.

Rating.—Will be calculated under the 1909 rules of the American Power Boat Association, with full time allowance.

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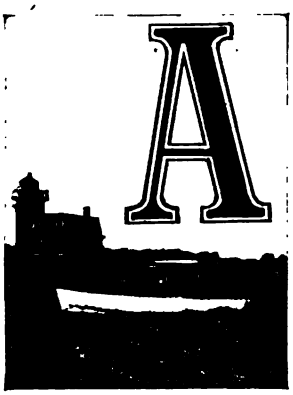
SPEED PROPELLER WHEELS

Harry J. Perkins, N. A.



AN explanatory article on propeller wheels no doubt will be of interest to many of the new readers and even the old readers of THE RUDDER, and I might say, be of some service to many of the engine and boat-builders, as some are not familiar with the method of design, construction, terms pitch, pitch ratio and in finding the pitch of wheels or laying out the pitch of propeller wheels, or selecting the proper wheels for each class or style of boat for a given horse-power and speed.

An article covering the many points in the above paragraph is a very hard article to write, as there are few who understand propeller wheels and there are so many elements that enter into the results of propeller wheels, but long experience has taught us that it is almost impossible to figure by any formula a proper wheel for a given boat and engine, without taking into consideration comparison or results of other experiments on many other boats. Practical experience is the best teacher, far better than theory, which often leads us to many mistakes.

Let us give you a little illustration, theory against practice, and also let me state that the writer of this article has been in the marine business for over twenty-years; was first connected with the old Sintz Company, now out of existence; since then with many other companies, and the last ten years with the Michigan Wheel Company of Grand Rapids, Mich., as manager. Coming back to my illustration, about five years ago a large company sent us the given data on a certain boat and engine, stating that the same data was sent to one of the best naval architects in New York City, who was to design and construct a special propeller wheel for this outfit in competition with our stock wheel. The results were rather surprising and very pleasing from the fact that our ordinary stock wheel won out, and the company received large orders for this style of wheel for these outfits. A good many similar cases could be cited.

It is a known fact that no two engines of the same model and build will develop the same horse-power, and that no two boats built by the same boat-builder will obtain the same results, in speed or stability, with the same power outfit. It is also well known that if you put a 10-h.p. engine in a certain boat with a certain propeller wheel, you will procure a certain number of revolutions. You transfer this power outfit and wheel into another boat and you are liable to increase or decrease the number of revolutions. These things cannot be figured out or fully explained.

To cover the many points in the first paragraph, we must commence at the beginning and first explain the action of a screw propeller wheel, which is practically the same as a bolt turning in a nut or piece of wood, which would advance with each revolution. So does a propeller wheel advance with each revolution in the water, less the slippage caused by displacement or weight of a boat and outfit. In other words, if we had a 20-inch diameter propeller wheel with 36-inch lead or pitch, it would advance theoretically 36 inches or 3 feet in the water at each revolution, acting the same as a screw as if it were turned in a non-yielding medium, or the water was solid. Accordingly it would push the boat 36 inches or 3 feet at every revolution, or at 800 revolutions the boat would travel, theoretically, 800×36 inches, or 28,800 inches divided by 12 inches (one foot) would equal 2,400 feet, or in one hour multiply by 60 minutes (one hour) would equal 144,000 feet. This divided by 5,280 feet (one mile) equals 27.3 miles per hour. This is the theoretical speed, but not the actual speed, owing to the fact that the water is yielding and the progress or advancement of the wheel is less than the pitch because of the yielding of the water caused by the displacement of the boat, and the difference is called slip or apparent slip, which is also due to the model of the boat and the propeller wheel suitable for the equipment.

The slip of the propeller wheel is the difference between its speed and the speed of the boat it propels. The slip is found by subtracting the actual speed from the theoretical speed. For example, the theoretical speed is 25 miles and the actual speed is 20 miles and the difference is 5 miles, or slippage. The percentage of slippage is found by dividing the theoretical speed by the actual speed, or 25 divided by 20 equals 12½%. The best propeller wheels give a slippage of 10 to 20%.

Actual speed or mileage is proven by going over a measured course in a certain limited time. The time should be taken both ways and averaged in case of wind or current.

There are certain designs of propeller wheels that cause more or less slippage. For instance, the larger blade area is generally indicated by an abnormal amount of slip at high speed and a small indicated thrust, and too much area is shown by smallness of slip. On two or three-blade wheels it seems to be pretty nearly equal above the given diameter of 18 inches. Below 18 inches I would suggest the two-blade if possible; although there is more vibration, it procures more volume of water and the speed results in many instances are better than a three-blade of small diameter, which is apt to churn the water, but the three-blade wheel is always well balanced. The greater the number of blades the coarser can be the pitch.

To decrease the slip and overcome the friction, the blades should be made as smooth as possible, especially the front edge, and sharp as a knife. The thickness of the blades should not exceed what the strength requires, with some elasticity if possible. A propeller wheel of large diameter and blade area, revolving at high speed, would by frictional resistance cause a waste of power greater than in wheels of increased pitch and somewhat smaller diameter and blade area. If by using a wheel of coarser pitch, the same speed can be obtained

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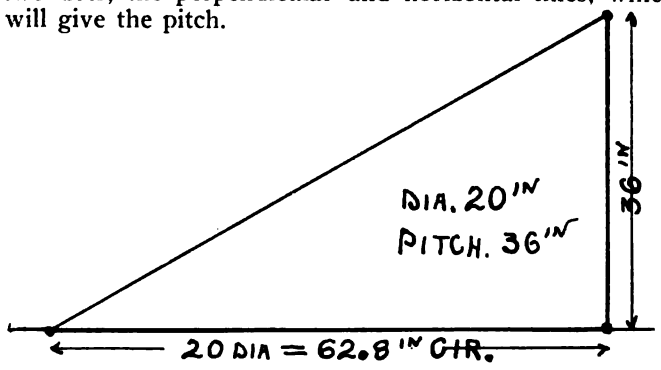
at the same number of revolutions, it will save the wear and tear on the engine, also the fuel consumption.

A propeller wheel may make good at a certain number of revolutions; increase or decrease the number of revolutions and it may fail. So far as our present knowledge extends, the most suitable wheel for an outfit can only be discovered by actual experiment, sometimes necessitating several changes in the pitch of the wheel and the design.

Pitch can be high or low, depending on the class of propeller wheel. For instance, a towing wheel with a low pitch, that is, a 20-inch diameter propeller wheel, would average about 20 or 22-inch pitch, while in a high-speed wheel it would run up as high as 40-inch pitch or lead, and in the ordinary propeller wheels for cruisers and launches the medium pitch is used, that is, about 28 or 30-inch would be the best adapted averaging on a 20-inch diameter wheel.

Now to lay out the pitch of a propeller wheel—this is very easy. For example, we take a wheel 20 inches in diameter, 36-inch pitch, and draw a horizontal line as per sketch, measuring along this line between two dots the circumference of 20 inches, which is equal to 62.8 inches. From one of these dots draw a perpendicular line 36 inches, then draw a diagonal line between the two dots, the perpendicular and horizontal lines, which will give the pitch.



It is also a very easy matter to take the pitch off an ordinary propeller wheel with straight lines, but on propeller wheels designed with slanting blades, the pitch radiating line disappears, and it is impossible as on the Twentieth Century speed wheel, but on the ordinary Standard or elliptical blades this can be done very readily by laying the propeller wheel on a flat surface, flat side down, taking a 2-foot rule with angle, set on the floor, and the other angle touching the periphery or tips of the blades square with the pitch radiating line. This angle transferred onto a drawing board, figure out the circumference from the diameter will give the pitch ratio of the wheel, as per above sketch.

A propeller wheel should be moulded from a metal pattern that is accurately balanced and polished. Then a casting made from the metal pattern is true to the original master or metal pattern. The metal used in the construction of propeller wheels should be of a composition bronze, tough, strong and wiry, practically non-breakable and non-corrosive.

In putting a propeller wheel on the shaft see that it fits tight to the shaft and has a key for torsional strain and set screws that go through the hub, and are countersunk into the shaft so the wheel will not pull off. On small wheels set screws are only necessary. Also be sure that the crowning sides of the blades are next or toward the boat, and the flat or working side aft or next the rudder, if the rudder is astern of propeller wheel.

The diameter of a two-blade wheel is measured from tip to tip. On a three-blade wheel the radius, that is from center of hub to tip of blade, multiplied by two would give the diameter.

Sizes of wheels usually adapted to diameter of shafts are as follows:

Two-Blade		Three-Blade	
10 and 12-in . .	⅝-in. shaft	12 and 14-in . .	¾-in. shaft
14 and 16-in . .	¾-in. shaft	16 and 18-in . .	1-in. shaft
18 and 20-in . .	1-in. shaft	20 and 22-in	1¼-in. shaft
20 and 22-in . .	1¼-in. shaft	24, 26 and 28-in . .	1½-in. shaft
24, 26, 28-in . .	1½-in. shaft	36-in . .	2-in. shaft

The pitch ratio of a wheel is usually assumed. For instance, we take a wheel 20 inches in diameter and multiply it by 1.8; we would then have 36-inch pitch or lead. The average pitch ratio ranges from 1.1 to 1.8, according to the design of the propeller wheel and the purpose used for. For instance, a towing wheel should have low pitch, while a speed wheel should have high pitch, which will be more fully explained later on.

A great variety of shapes and forms of propeller wheels are designed. It seems that they can be almost any shape the fancy may dictate. There are the slanting blades, the form that is used on the Twentieth Century speed wheel, which makes this wheel of the semi-weedless type. It will go through ordinary weeds and over rocks and logs and is much appreciated on lakes for speed boats where weeds are troublesome, and also on rivers. Owing to the slanting form of the blades it consumes considerable power. For instance, a 20-inch of this type would be equal to about a 22-inch of the elliptical blades, for if the blades were stretched out on the pitch radiating line, they would average better than 22 inches. This type of wheel takes all the water at the hub and uses the full blade area.

By exaggerating the slanting blade and putting a bell shape at the hub, we have what is known as an absolutely weedless wheel and it is a fairly good speed wheel. This form is only made in the two-blade. It cannot be made very readily in a three-blade owing to the fact that the bell would form a disk at the hub and bank up the water in front of the wheel. The propeller shaft should be protected on this type of wheel by a loose tube set over the shaft, and a weedless rudder should be used in connection with this wheel, then you would have an absolutely weedless outfit.

Now in selecting a propeller wheel for certain classes of boats it is well worth bearing in mind the shape of the blades to suit the boat. The diameter and pitch is controlled more by the power. Propeller wheel manufacturers are always up against it on power; why some gas-engine builders will rate a 10-h.p. engine at 15-h.p. and others a 10-h.p. at 8-h.p., can never be explained. It is easy to figure the rating for h.p.; the correct and simple method is:

$$\text{H.P.} = \frac{\text{P L A N}}{33{,}000}$$

P = M E P 65 lb.
L = Length of stroke in feet.
A = Area of piston in inches.
N = Number of explosions, not revolutions.

Two-stroke has one explosion to each revolution.

Four-stroke has one explosion to every other revolution.

M.E.P. is the mean effective pressure, derived by a card by use of an instrument called an indicator, which is placed on top of cylinder. Each explosion drives the lead pencil on the card up to a certain point, while the drum of the instrument is rotated by a string connected

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to a pin at a certain distance from the center of the fly-wheel, which gives a card of this shape.

To procure the area of a card a planimeter is used. To find the mean effective pressure (M.E.P.), first the area of the diagram or card in square inches may be found by the planimeter. The M.E.P. is then found by dividing the area of diagram in square inches and multiply by the scale of the spring as used in the indicator.

Example—The area of card is 5 square inches and the length is 3 square inches, a 40-lb spring being used for the M.E.P.

Solution— $\frac{5}{3} \times 40 = 66.66$ square inches = M.E.P.

Example—How to figure horse-power of a four-stroke, four-cylinder, 4-inch bore, 4-inch stroke, 800 r.p.m.

Solution—H.P. $= \frac{P\,L\,A\,N}{33{,}000} = \frac{65 \times 33\frac{1}{3} \times 12.5 \times 400}{33{,}000} = 12.6$

Example—Two-stroke, two-cylinder, 4-inch bore, 4-inch stroke, 800 r.p.m.

Solution—H.P. $= \frac{65 \times 33\frac{1}{3} \times 12.50 \times 800}{33{,}000} = 25.3$

If the propeller wheel manufacturer was always given the following data on engine and boat, covering the principal points, it would be a very easy matter to select the proper wheel for a given outfit and one to produce the best results. This following data should always be given when requesting a propeller wheel or even a reverse gear. The bore, stroke, number of cylinders, number of revolutions, two or four-stroke. Boat breadth, length, displacement, draught, heavy or light, fine or coarse lines, bow, stern, construction, open or cabin, and for what purpose used.

The action of the propeller wheel in water should force the water astern, not throw it off on the ends of the blades, nor churn, which would cause loss of power and speed and increase the slip.

Boats especially designed for speed should be light in construction, fine lines with powerful engines; should use propeller wheels of elliptical blade type, large in diameter, with a pitch ratio ranging from 1.5 to 1.8. Such classes of wheels as the Auto Royal and Dixie are best adapted for boats of the long, narrow racing type, which require a wheel of high pitch, as the boat will move freely and easily through the water and the percentage of slip be normal.

For the medium-weight boat, including the cruiser, trunk cabin or even the open boat of fairly coarse lines, would require a wheel of lower pitch, a pitch ratio of 1.4 to procure the best speed results.

For heavier working boats with coarse, blunt lines, and short draw to the propeller wheel, such as a heavy cruiser or any type of boat heavy in construction, would require a wheel with broad blades and low pitch, or pitch ratio of about 1.1 to 1.3.

The diameter of a propeller wheel is not determined by the size of the boat, nor the style, but by the h.p. or rating of the engine, which must always be taken into consideration, for you well know if you had a 30-foot boat you could install a 10, 20, 30 or 40-h.p. in it and run from 400, 800 or even 1,000 r.p.m., depending entirely upon the diameter, blade area and pitch of propeller wheel. Accordingly the diameter must be selected as to the horse-power, and the style, shape or form of the blades as to the boat.

It is advisable to keep the propeller wheel shaft as near 5 or 10° as possible. It is not considered good practice to exceed 12°, and it is also a good idea to use a universal joint in connecting the propeller wheel shaft to the engine or reverse gear, as the case may be, as this relieves the torsion or undue strain caused by vibration and twisting of the hull, and it also facilitates perfect alignment.

In using a joint you must always use a thrust bearing aft of joint to relieve the propeller wheel thrust on the universal joint, otherwise the joint will not last any length of time and the manufacturer will catch it.

The design of your boat should be such that the propeller wheel will have a long draw on the water or free water. In order to procure the greatest efficiency there should be no obstruction of any kind on the dead-wood or skeg. The dead-wood and shaft log should be as small as possible. In case the dead-wood is of large size, then a three-blade wheel of as large diameter as possible is better adapted, as in case of a two-blade when it stands perpendicular with the dead-wood, the water is almost cut off and this causes vibration. Although the wheel will be blamed for the vibration the cause is the boat, but it is usually laid to the propeller wheel.

There are several things that cause a wheel to vibrate. First, the wheel not being bored in the center, or off center, or slightly on the diagonal. Second, the blades may be unbalanced, caused by thick blades or some being narrower than others. Third, the pitch not being true, that is to say, each blade may have a different pitch.

So far our article has been on solid propeller wheels. There are still other types of propeller wheels worth mentioning, such as the adjustable, reversible and feathering reversible.

The adjustable propeller wheel is designed the same as a solid wheel with the exception that the blades fit into the hub and can be adjusted to any pitch required to give the best results in connection with the power of the engine or the model of the hull. This type of wheel sometimes saves considerable experimenting and expense of a complete set of solid wheels, and the blades can be set at any pitch, and if it is necessary they can be detached and replaced with different sizes.

The reversible wheel in a way is an adjustable wheel or variable pitch wheel, manipulated by a lever which is inside the boat next the engine. The pitch of the blades can be changed to full lead ahead or full speed ahead or reverse for backing up, or the blades can be set at the neutral point, that is, the periphery or tip of the blades square with the shaft. In this position the boat will neither go ahead or back up, and by use of a friction clutch the propeller wheel can be thrown out of operation when starting or stopping, the same as a reverse gear.

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Restless, Designed and Built by The Atkin-Wheeler Company for Thomas F. Chesebrough, for the Defense of the British International Trophy

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NINETY-FOUR-FOOT CRUISER

THE following plans are those of a 94-foot power boat designed by Bowes & Watts, of Philadelphia, for Mr. John J. Riker, New York City, and the boat is now nearing completion at the yard of John H. Mathis & Co., at Camden, N. J.

The boat is of the steamship type with a deckhouse and raised poop. The fore body and the after body are very similar to the high-speed turbine steamers built in Scotland two or three years ago. The fore body has considerable flare and flam. The deck is flush from the forward end of the poop to the stem, and the forecastle is not raised, as is usually done in boats of this type, bulwarks being fitted forward instead; in this way it will be possible for the crew to handle the anchors and get around forward in bad weather. A great many boats of this type that have been turned out lately have had heavy turtleback decks over them, so that it was impossible for the crew to stand up on them in bad weather.

This yacht will be equipped with two spars, stepped through the deck, and will be used to carry a liberal amount of sail. The deckhouse is sunk about one foot below the main deck, and still allows over 6 feet headroom in the storeroom, captain's and engineer's staterooms.

The dimensions are 94 feet over all, 88 feet on the load water-line, 18 feet breadth at deck, and 5 feet draught. With this draught it will be possible to take the boat in and out all the shoal inlets along the Southern coast.

The construction is quite heavy throughout, and is considerably in excess of Lloyds for this type of boat, as the weight has been put into the hull materials instead of into ballast. While this slightly increases the cost of construction over the lighter built boat with ballast at the same time it produces a boat that, should she lay ashore over a tide on a flat, will not strain like the lighter boat with the ballast.

The engine room is situated nearly amidships, and is separated by tight steel bulkheads from the rest of the vessel. Four tanks of a capacity of 125 gallons are situated on each side of the engine room. These tanks are placed in pans above the load water-line, so that any leakage will drain overboard. This tankage will give the boat a cruising radius of about 1,000 miles. The power will be a 100-h.p. six-cylinder Standard air-starting and reversing engine. A direct-connected Standard unit with a 4½-k.w. generator, also fitted with bilge pump and air compressor, will be fitted on a platform at the forward starboard end of the engine room. Twenty-four storage cells will be fitted on each side under the tanks. The engine will exhaust through mufflers placed in the funnel. On the forward port side a work bench will be fitted.

Aft of the engine room there will be a library the full width of the vessel, and 9 feet long, fitted with an extension transom on each side, with bookcases in back. At the forward end will be a fireplace, and room for a desk or small piano. The smoke pipe from the fireplace will lead through the funnel. There will be three ports on each side and an overhead skylight to light this room.

Aft of the library on the port side will be a stateroom, fitted with a double bed with drawers under, also wardrobe and bureau.

Opposite this stateroom on the starboard side will be the guest's bathroom, which will be fitted with lockers, bathtub, w. c. and basin. The companionway comes down athwartship aft of this bathroom, from the starboard side.

Aft of these two rooms will be the owner's double stateroom, which will extend the full width of the vessel, and will contain a double bed on each side; on the starboard side there will be a wardrobe, and on the port side a chest of drawers and combination desk.

Aft of the owner's stateroom will come the owner's bathroom, which will contain lockers, bureau, bathtub, w. c. and basin. These five rooms complete the owner's accommodations below decks. The object of this layout was to accommodate a few people comfortably, and not to crowd any one compartment. By crowding all the compartments a little bit, and doing away with the after bathroom, it would be possible to fit two more staterooms.

Forward of the engine room there will be a storeroom the full width of the vessel, and 6 feet long. This will contain the refrigerator, and shelves and lockers for general stores, and on the port side there will be a dumb-waiter from the galley above, so that the crew can be conveniently served in their messroom below.

Forward of the storeroom there will be two staterooms, the one on the starboard side for the captain, and the one on the port side for the engineer. These staterooms are 8 feet long, and contain berths, drawers, desks, bureaus, and folding wash-basins.

Forward of the officers' quarters will be the crew's messroom, which will be the full width of the vessel and 5½ feet long. A crew's messroom is seldom fitted on a boat of this size, but adds greatly to the comfort and efficiency of the crew, as otherwise the crew would have to be served in the forecastle or in the galley on deck.

Forward of the crew's messroom there will be located the forecastle, which will contain four pipe berths; forward of the forecastle will be the crew's toilet room and the forepeak. The crew's accommodations on this boat are exceptionally fine, and are not crowded clear in the eyes of the vessel.

The deckhouse will be located over the officers' quarters, the storeroom, and partly over the engine room. This deckhouse will be 18 feet long and 12 feet wide. At the after end the galley will be located, and will be 6 feet long containing Shipmate range, sink, dumb-waiter, lockers, and water-back for hot water in the owner's quarters, and a hatch leading to the storeroom below. The rest of the deckhouse will be used as a dining saloon and will have a transom across the forward end, and a buffet at the after end. There will be a door on each side opening on the deck.

The bridge will be located between the funnel and the after end of the deckhouse. The bridge will be quite roomy, and will have accommodations for three or four deck chairs in addition to the steering gear and engine signals. The searchlight at the forward end of the deckhouse will be controlled from the bridge aft.

The owner's quarters below will be Colonial in finish, while all the outside and deck trim will be of mahogany.

The boat was designed for use on Long Island Sound and along the coast in Summer, and for trips to Florida and the West Indies in Winter, and should admirably fulfil these requirements, as with her moderate draught she will be able to visit the shoal waters of the South, and with her seagoing form will be able to withstand any weather she may encounter crossing the Gulf Stream or going around Florida.

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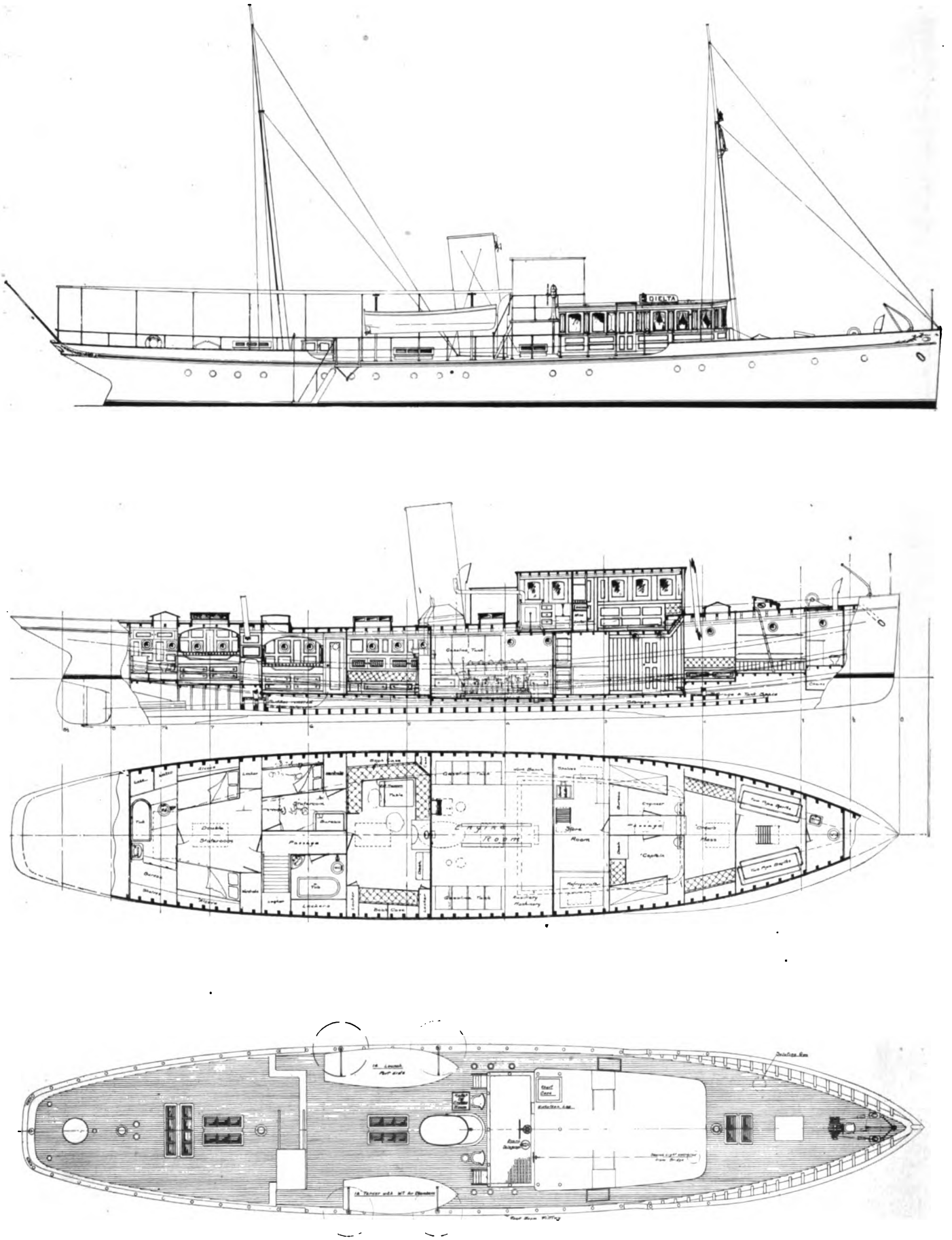

Ninety-Four-Foot Cruiser Designed by Bowes & Watts and Built by John H Mathis & Co., for Mr John J. Riker, New York City

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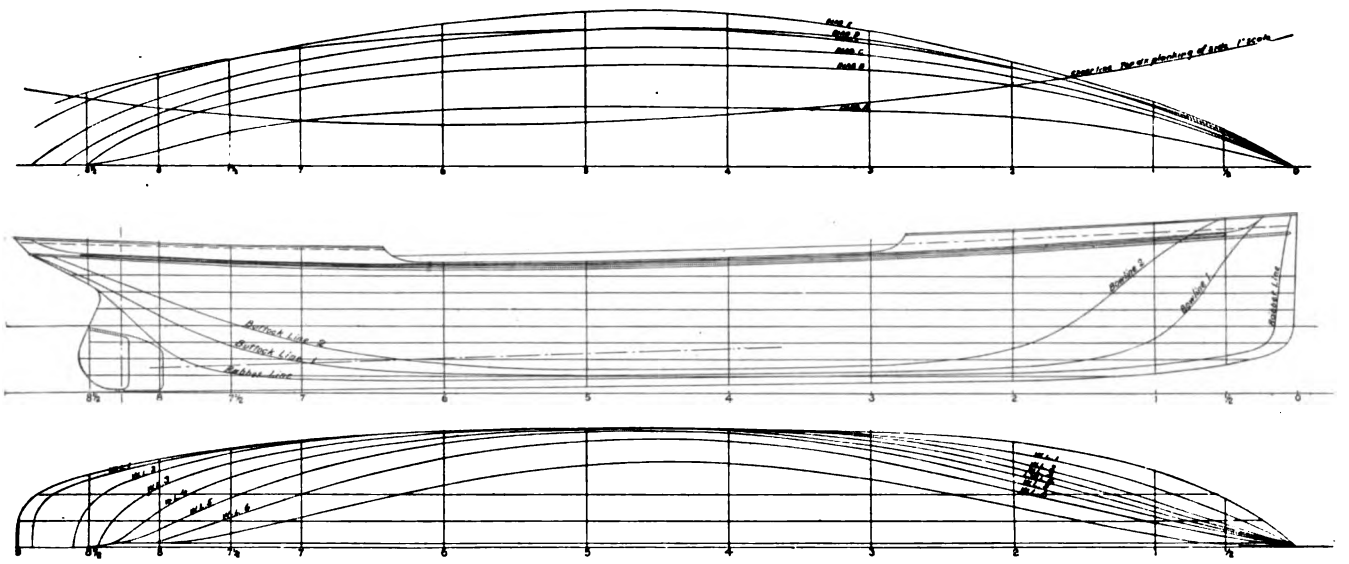

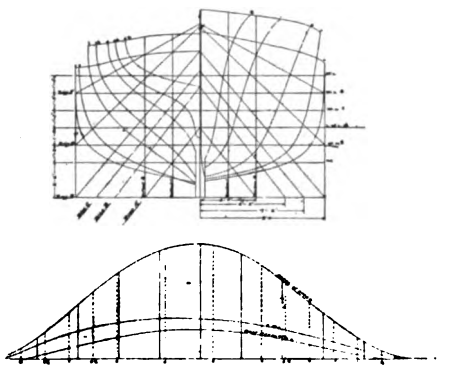

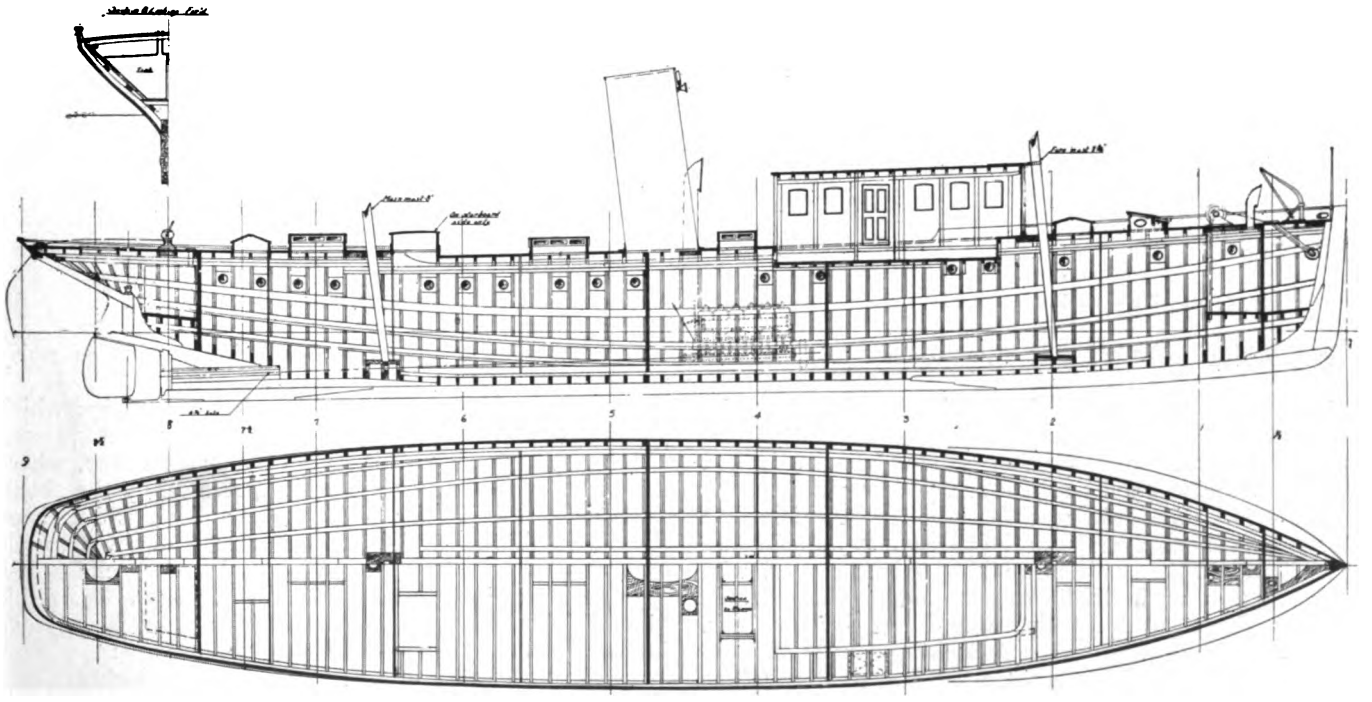

Lines and Construction Plans of Ninety-Four-Foot Power Cruiser

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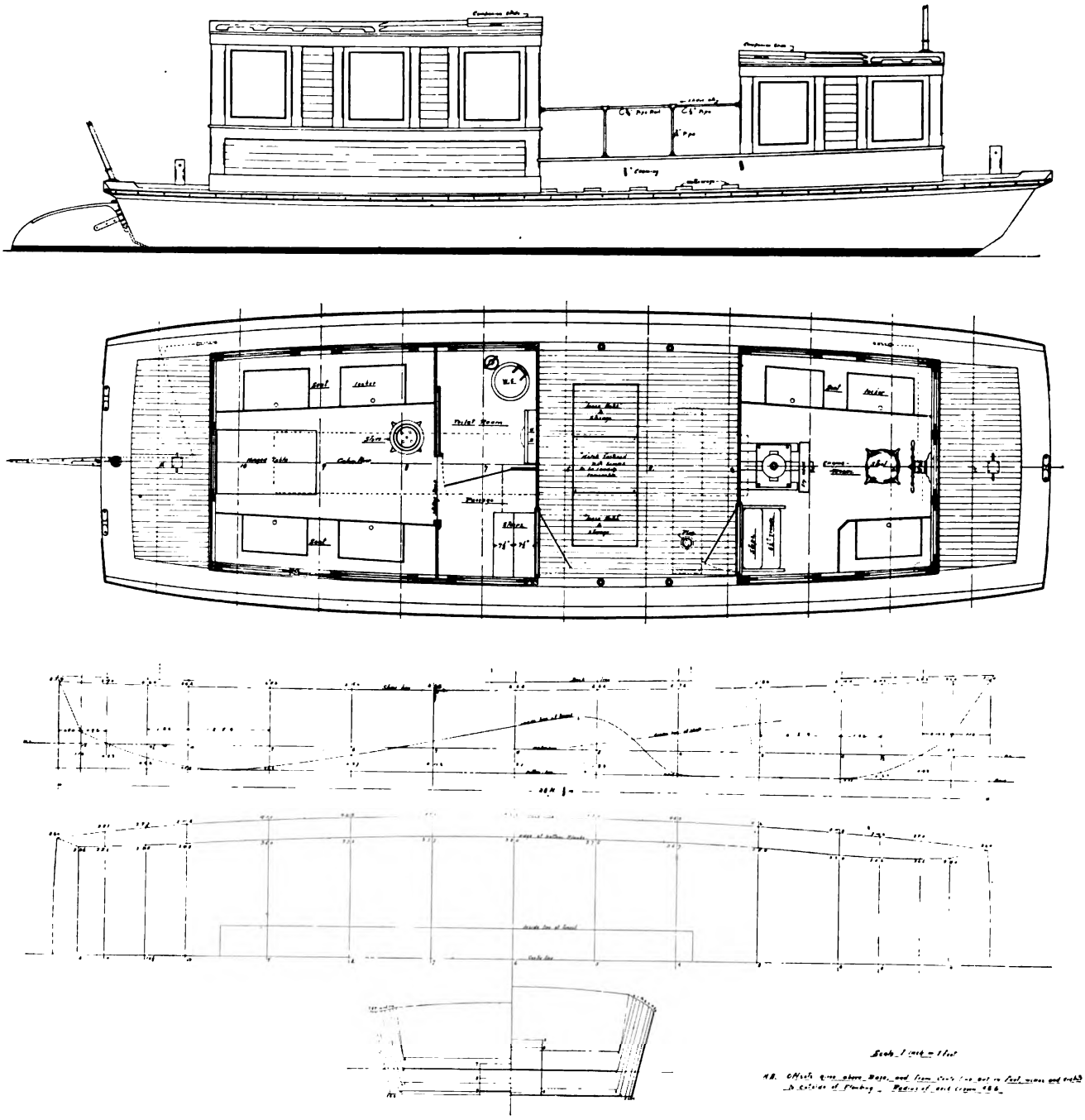

Twenty-Eight-Foot Power Scow. Designed by Roger M. Haddock, New Rochelle, N. Y.

TWENTY-EIGHT-FT. POWER SCOW

THIS boat is a combination of ideas worked out by the owner and designer to produce a boat that would run at a moderate speed on a draught of about 9 inches. The boat is heavily built of oak and yellow pine, a small cabin aft has toilet and wash-basin on port side. The cabin proper is shut off from the passage at the entrance by a sliding door. This is an idea of the owner, who wishes to use her in cold weather, and prevents a cold blast from entering every time one leaves for the deck. The engine is also in a house, which protects the engineer and also furnishes a place for him to sleep. The tunnel type was adopted as being the simplest way to attain the light draught and is preferable to a stern wheel with its attendant chain and gearing, which is noisy and troublesome.

The power is a single 7½-h.p. Mianus engine which should give about 6 miles per hour under average conditions. The boat will be used on Barnegat Bay, where the range of waterway is greatly increased by the shoal-draught of this boat. Deck space amidships has been provided to carry freight and stores from town to the owner's place on the bay. It is possible to spend a few days on a trip in the Fall with comfort in a boat of this kind, as she can be heated easily with a kerosene stove in cold weather. The general dimensions are:

Length o. a.	28	feet	0	inches
Breadth	8	"	0	"
Draught	0	"	9	"

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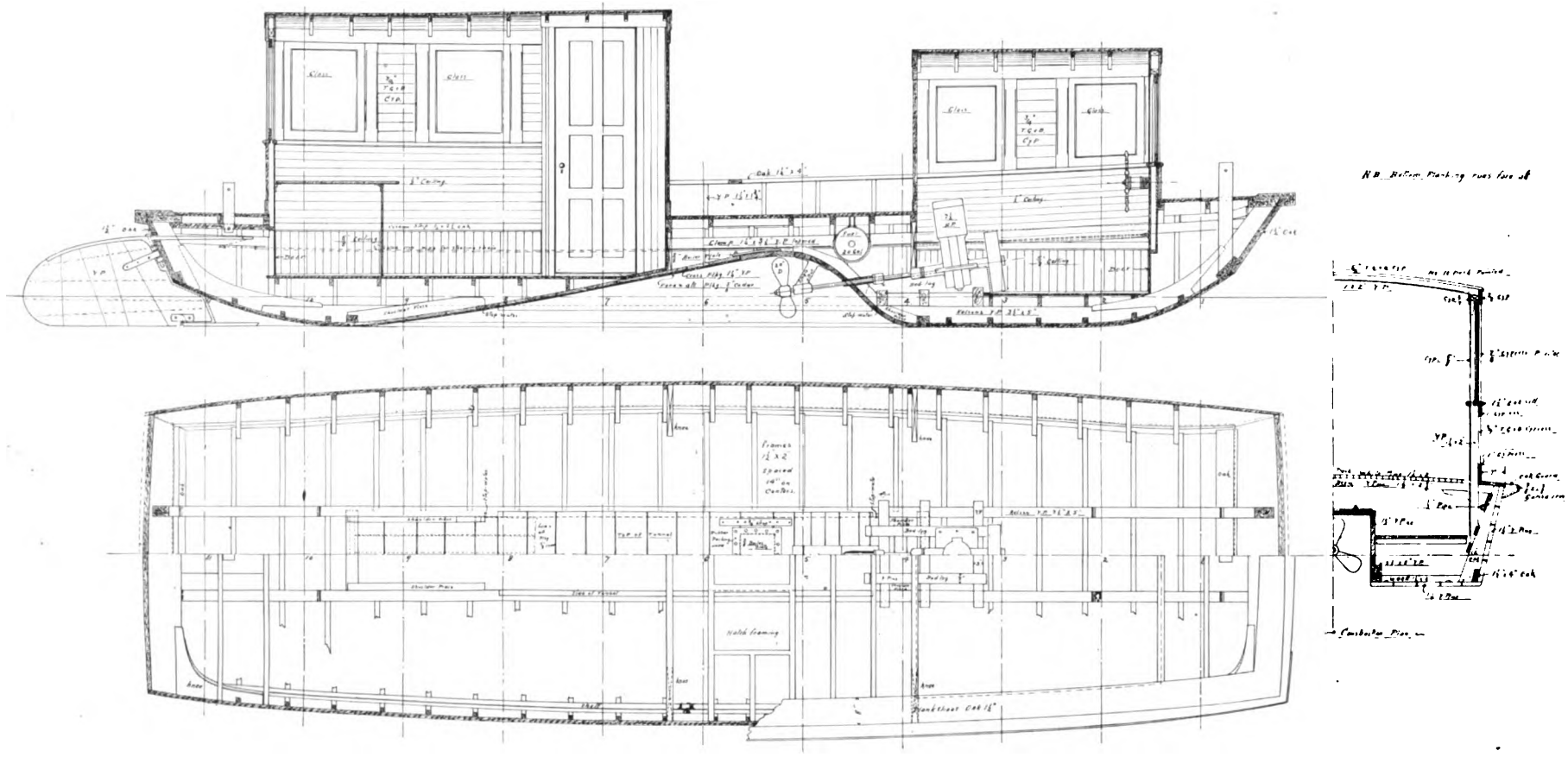

Construction Plans of Power Scow

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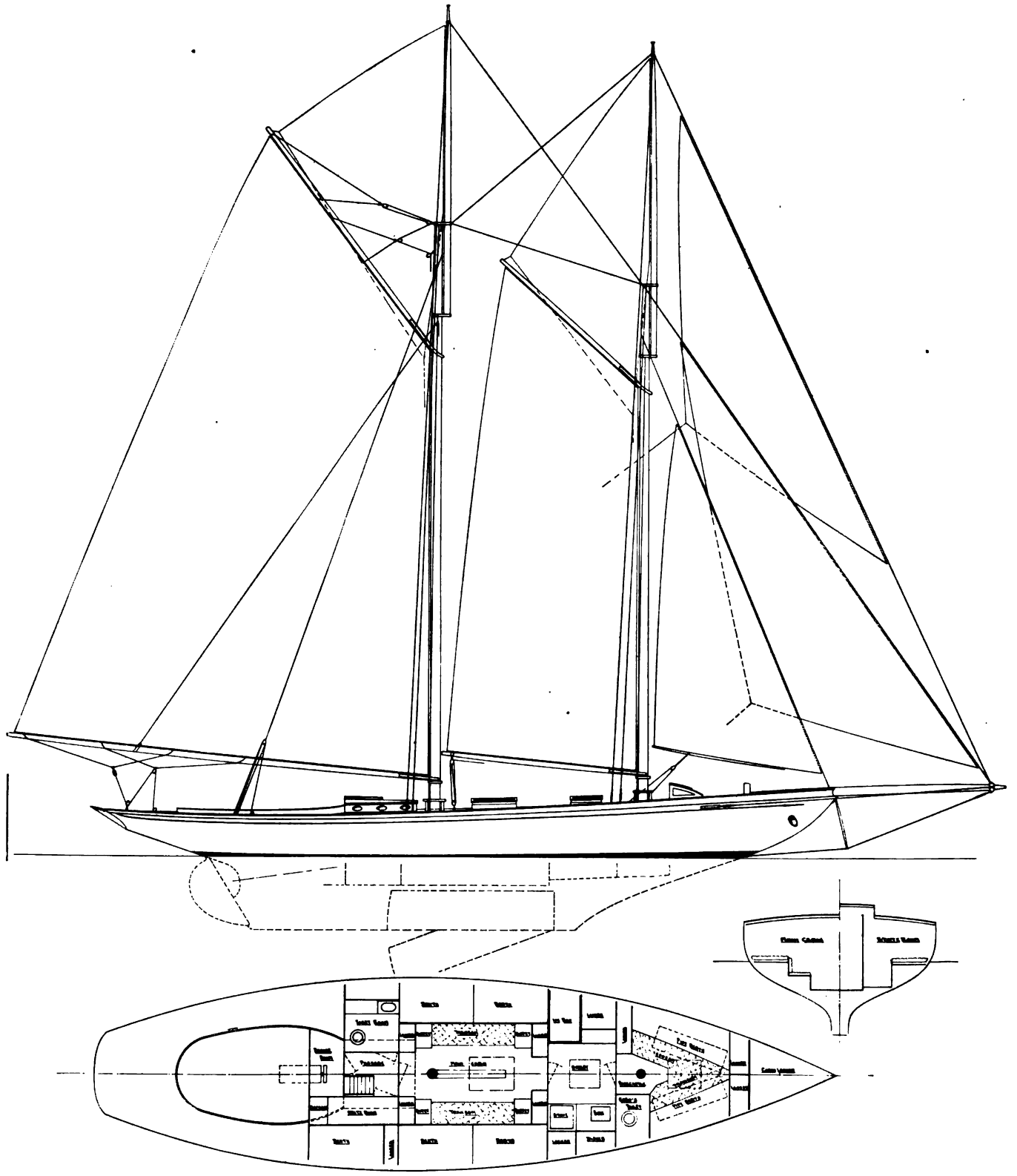

Auxiliary Schooner Yacht. Designed by Carlton Wilby, Detroit, Mich.

AUXILIARY SCHOONER YACHT

THE auxiliary schooner yacht shown herewith is a proposed design by Carlton Wilby for a well-known yachtsman, of Detroit. She was designed for use on Lake St. Clair, and for extended Summer cruising upon the Great Lakes. Because of the shoal water encountered on Lake St. Clair, the draught has been limited to 6 feet 6 inches, with a centerboard housing in the keel and entirely below the cabin floor.

In spite of the restricted draught, full headroom and some inches to spare has been obtained, all fore and aft, with a flush deck.

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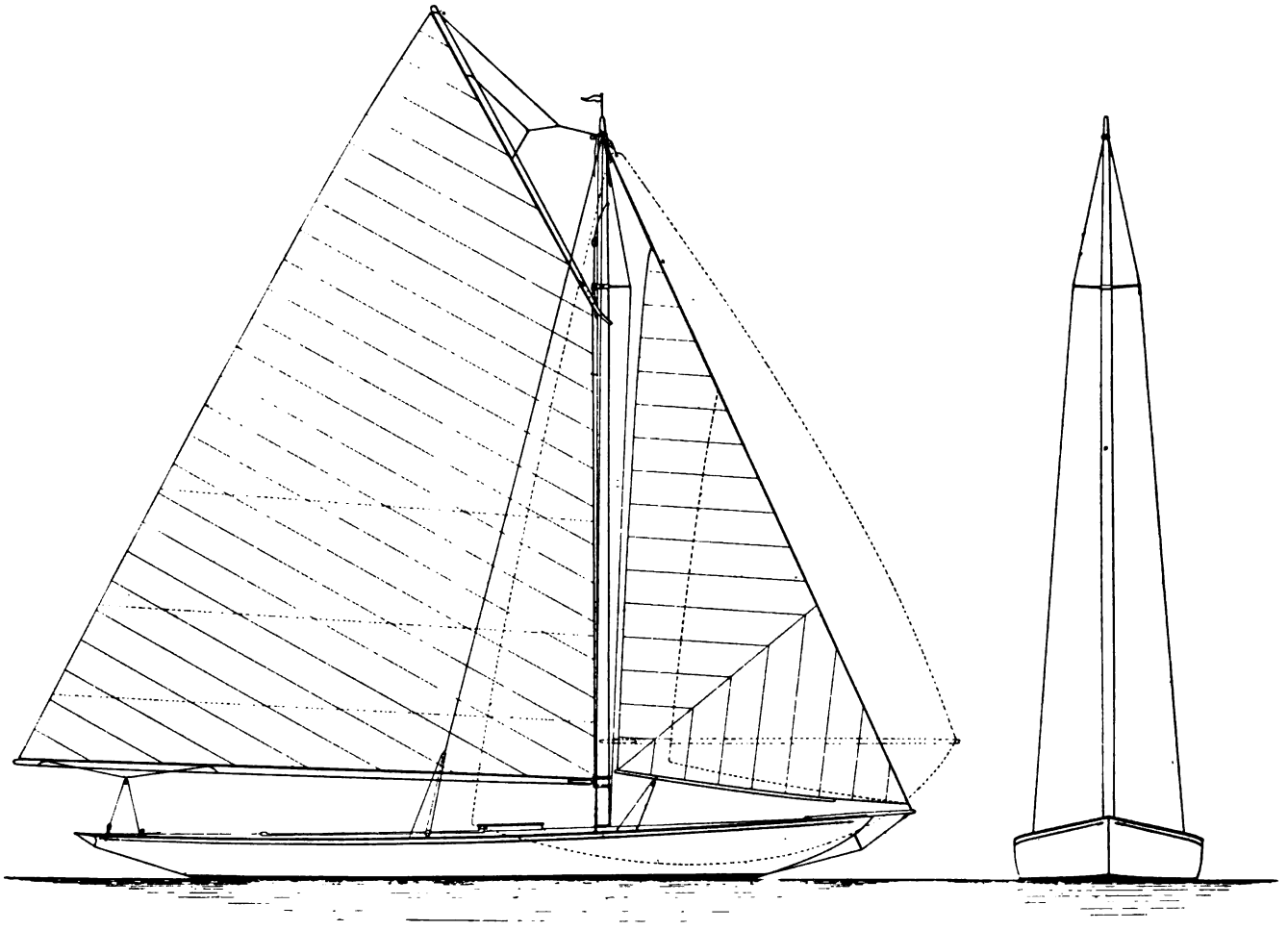

Twenty-Seven-Foot One-Design Sloop. Designed by H. J. Gielow

A breadth of 17 feet allows for a very commodious cabin, which provides sleeping accommodations for seven persons in addition to a crew of four men in the forecastle. Four berths and two wide transoms are shown in the main cabin, and another berth in the stateroom on starboard side aft. On the port side a very roomy toilet room is located, with the usual conveniences. This location of toilet room is very convenient, as it is easily accessible from stateroom, main cabin or cockpit.

The engine room, located under bridge deck aft, is entered from the passage and has full headroom. Hooks for oilskins will be provided at port side of engine room bulkhead, and ample space for stowing spare sails will be found under cockpit floor and easily reached from engine room.

A very spacious galley, 6 feet long and the full width of the boat, is shown forward of main cabin, and fitted with every convenience. Forecastle has two transom berths, two pipe berths, crew's toilet, and ample locker accommodations.

It is expected to install an engine capable of giving a speed, under power alone, of about 7 miles an hour.

Principal dimensions are as follows:

Length o. a.	65	feet	0	inches
Length w. l.	47	"	6	"
Breadth	17	"	0	"
Draught	6	"	6	"
Freeboard, forward	5	"	7	"
Freeboard, least	3	"	3	"
Freeboard, aft	3	"	9	"

MANHASSET BAY ONE-DESIGN CLASS

THE Manhasset Bay one-design boats, drawings of which are shown herewith, were designed by Mr. Gielow, before the change in the measurement rule last winter. The boats are 27 feet 9 inches over all and five of them were built, *i. e.*, Mahaska, W. Butler Duncan; Althea, J. W. Alker; Kit, John F. O'Rourke; Scylla, Edgar A. Sierck, and Ardette, Com. Clarkson Cowl.

The boats rate at 16.72. They have 2,500 pounds of lead ballast bolted on the keel, and have a sail area of 435 square feet. They are constructed in the best possible manner, and, after a season of continuous hard racing, are in absolutely perfect condition. They are provided with two water-tight bulkheads and a water-tight, self-bailing cockpit, so that they are practically unsinkable.

Towards the end of the season a match race was arranged between these five boats and an equal number of the Glen Cove one-design Jewel S. class boats, for a cup offered by Commodore Hazen Hoyt of the Manhasset Bay Y. C., the cup to be won by the yacht scoring the most points. Three races were sailed, and Althea proved the winner.

The principal dimensions are:

Length o. a.	27	feet	9	inches
Length w. l.	19	"	5	"
Breadth	6	"	7	"
Draught	4	"	11	"

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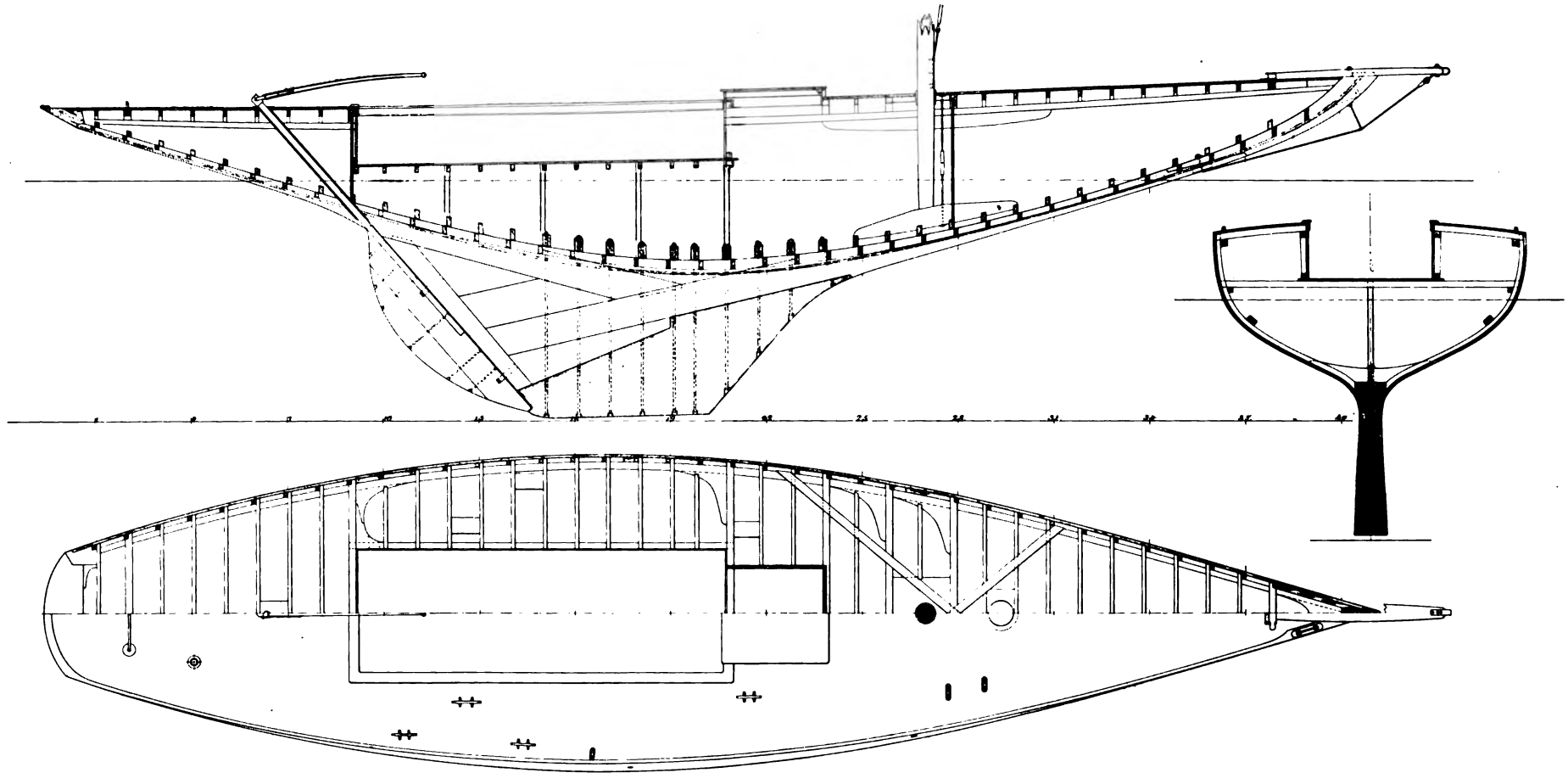

Construction Plans of Manhasset Bay One-Design Class

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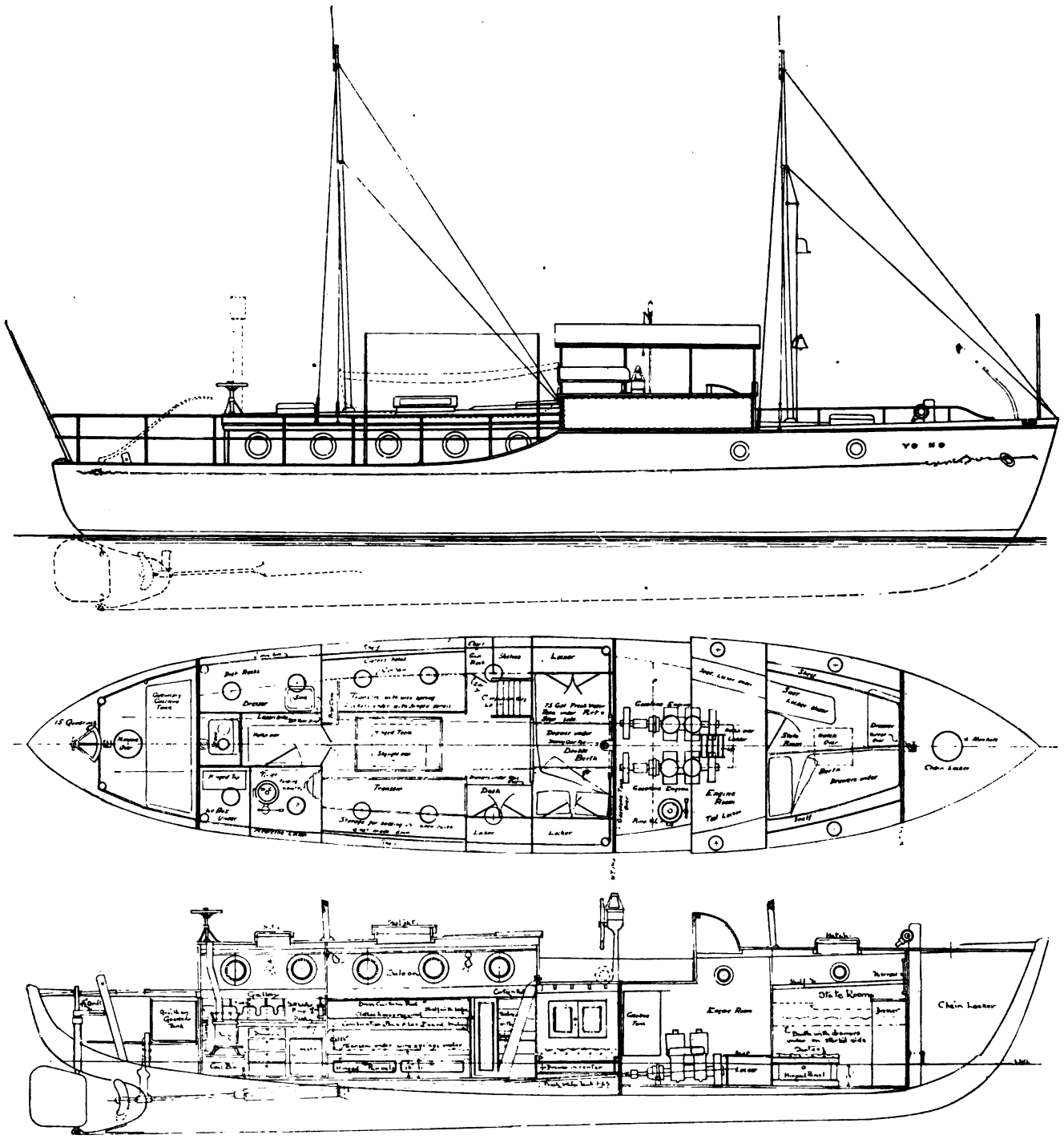

Forty-Seven-Foot Power Cruiser. Designed and Built by the Bath Marine Construction Company

BERMUDA RACER YO HO

THE accompanying plans are of a 47-foot cruiser which is being built by the Bath Marine Construction Company, Henry Douglas Bacon, Pres., for F. P. Bacon, Esq., of Los Angeles, Cal. This boat was a starter in the recent Bermuda race.

The arrangement is as follows: Chain locker forward of water-tight collision bulkhead, next the stateroom with double birth, chiffonier, settee, etc. Next comes the engine compartment, which contains besides the twin engines, an electrical generating plant, air compressing plant, racks and lockers for tools and also toilet for the crew. Aft of this and separated from it by a water-tight and gas-tight bulkhead, is the main saloon, which is lighted by a skylight and six large air ports. On each side of this room are extension berths and in the center of the room a folding table.

A companionway leads down on the starboard side, alongside of which is the gun rack and closet for clothes, etc. On the other side are a desk, leaded glass lockers and deep drawers. At the forward end of the room is a double berth with lockers on each side and large drawers under. The saloon is in cream enamel, trimmed

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with mahogany, which gives the boat a light and handsome appearance, and book shelves, mirrors, etc., are provided. Aft of the saloon and separated from it by double doors, is the galley, which is not only ventilated by three large air ports but has a large hatch over it, which can be used for access if necessary. Wood and coal stove set in zinc and asbestos lined compartment for cooking purposes. In connection with this is a fireless cooker for use in rough weather when it would be hard to get a warm meal; large storage space of provisions and cooking utensils, rack for dishes and porcelain sink with pump and large ice-box make up the cooking arrangement. On the starboard side aft of the cabin is a large toilet with all modern conveniences. Another water-tight bulkhead is arranged at the stern aft of the galley, these three dividing the ship into four compartments. The gasolene, 500 gallons, is carried in three separate tanks being built extra heavy and are provided with air pressure attachments, so that the gasolene is fed to them by pressure to an auxiliary tank in an engine room, an automatic device being arranged to take care of this. This boat is of the flush deck type and all openings in the hull are made extra strong and with means for fastening on shutters.

Provision has been made for steering the boat from two places, from the bridge or from the after part of the house. An emergency tiller is also provided. The fresh-water tank is located under the floor of the boat, as are also the air tanks. Hand rails capped with mahogany surround the boat and life-lines are run forward of the stem head. The boat will carry, besides the large tender in davits, a life-raft of appropriate design. She will be fitted with two polemasts and sails for use in emergency. The boat is rather unique in design and is finished outside entirely in white, except where she is relieved by gold depressed bead which connects the scroll at bow and stern, and with mahogany bead companionways, hatches, rails, etc. Mr. Bacon has named the boat Yo Ho and she hails from Bath and entered the Bermuda Race under the Kennebec Y. C. flag.

EIGHTY-FIVE-FOOT CRUISER

THE accompanying plans show an 85-foot gasolene cruising yacht now under construction at the yards of the Matthews Boat Company, Port Clinton, Ohio, for Mr. H. A. Parsons, of Cleveland, Ohio.

The general layout and profile were prepared by the Matthews Boat Company under the supervision of Mr. Parsons, and the lines furnished by Messrs. Cox & Stevens, naval architects, New York City.

This is the second large cruising launch which has been purchased by Mr. Parsons from the Matthews Boat Company, and will be known as Mahapa II, and be used on the Great Lakes and at his Summer home on Lake Superior.

As will be observed, the craft will be of the flush deck type, with deckhouse forward, and the construction provides for a boat that will withstand the roughest weather conditions. The freeboard of the boat is very liberal, and a considerable flare will be worked out on the forward quarters.

The hull will be built with the Matthews type of keel and keelsons which box over frames. and over which are laid heavy oak floors. The minimum depth of solid keel is 14 inches. Tapered frames of steam-bent white oak. Frames to be doubled at steel bulkhead location, and in the way of engine room. Clamps and stringers of long-leaf yellow pine thoroughly riveted to frames. Planking of selected long-leaf yellow pine from keel to water-line, tapering in thickness from 1⅞ inches at the keel to 1½-inch thickness at the water-line. Planking above water-line or turn of bilge to be of Virginia cedar, in long lengths, and tapering from 1½ inches at the water-line to 1¼ inches at the deck line. All fastenings of planking, copper boat nails, riveted over burrs.

A feature that has been carefully worked out is the matter of engine bearers, which will be a built-up frame of white oak, composed of heavy thwartship floors notched over keel, keelsons, and clamps, and extending to sides of the boat. Over these floors are bolted long longitudinal timbers which will receive the engine frame flanges. The bearers are made to extend over a large surface to absorb all possible vibration. The safety and stiffness in construction are provided by four water-tight bulkheads, which divide the boat into five compartments. The collision bulkhead at the forward portion of the vessel is to be built of diagonally laid cypress, with heavy painted canvas between.

The decking is of white pine, laid on oak beams. Plank-sheer of white oak. Outside finish of house and superstructures in select Honduras mahogany. The interior of the deckhouse to be finished in Honduras mahogany throughout, and arranged to be used as a dining saloon. A buffet and desk with book-shelves over, are located on the after bulkhead. Ten people can be accommodated in the dining saloon. The galley is immediately aft of the dining saloon, and is fitted with a 6-hole coal range, sink, lockers, dish racks, and refrigerator which extends under the bridge deck, as indicated. Entrance to the pilothouse is arranged on the starboard side aft.

The tanks are kept as low as possible, and arranged for gravity feed to carbureters. The tanks are to be built of heavy rolled copper, and to be three in number, having a combined capacity of 1,000 gallons. Every provision for the safety of the installation is taken care of, and an inspection may be made at any time of the complete system.

The motive power consists of two 60-h.p., four-cylinder, Craig engines, which are expected to drive the craft 13 miles per hour. The exhaust is to be carried through the stack as indicated, and with this arrangement, good ventilation can be secured in the engine room.

A lighting set consisting of a 5-h.p., two-cylinder, four-stroke engine attached to a 40-lamp generator. Storage batteries are provided for reserve current, and all light fixtures are especially designed bronze, and suited for 110-volt Tungsten lights.

The owner's quarters are located aft, and the owner's stateroom is arranged to extend the full width of the boat, with a large double berth on the starboard side, and sofa berth on the port side. All available space is to be utilized in wardrobes, shelves, and alcoves. The dresser is arranged on the forward bulkhead, and fitted with mirror. The upholstery of the room provides for silk velour cushions, with spring bases, and backs to seats, as shown.

General dimensions are as follows:

Length o. a.	85	feet	0	inches
Length w. l.	81	"	6	"
Breadth	14	"	0	"
Draught	4	"	0	"

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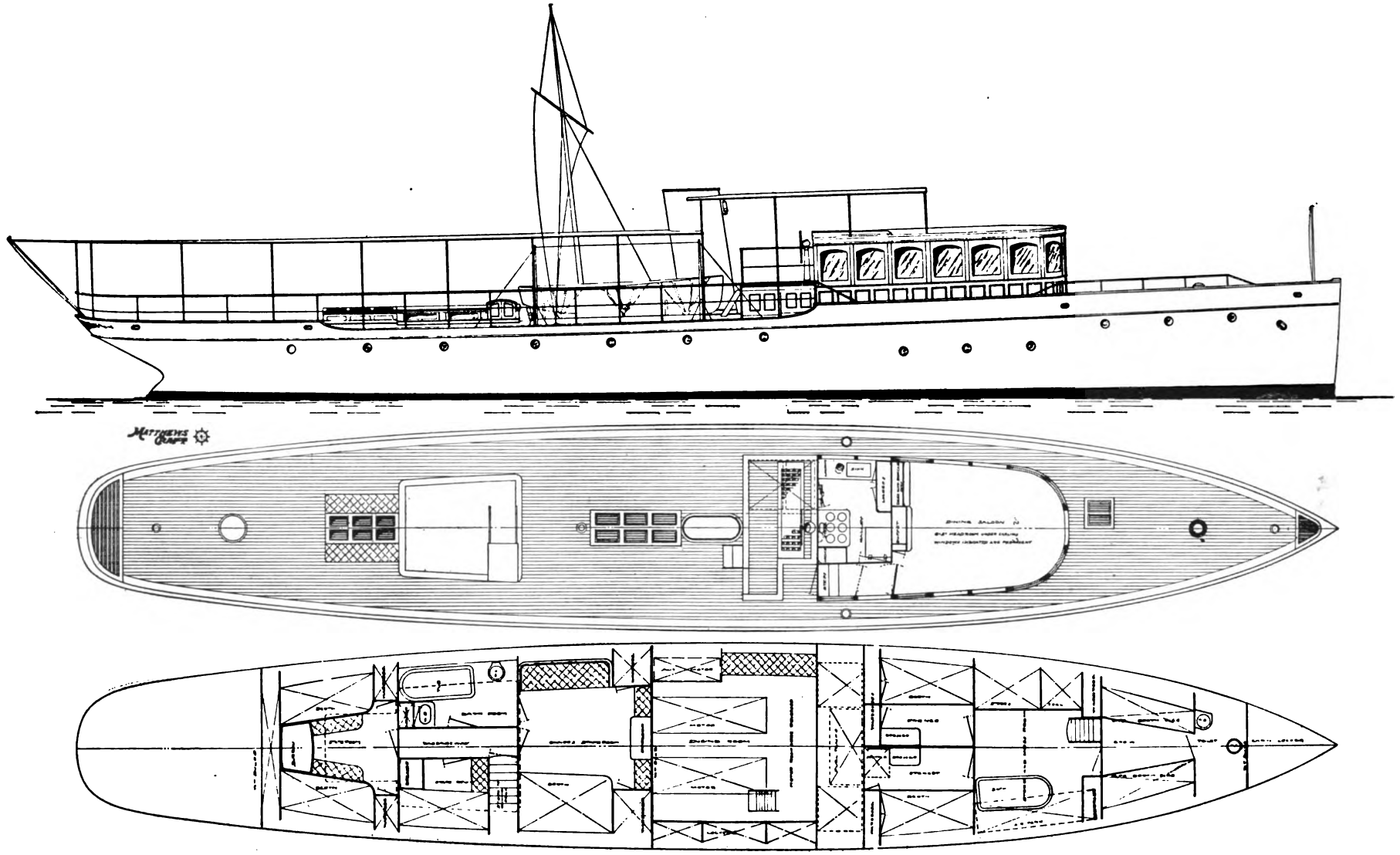

Plans of Eighty-Five-Foot Cruiser. Designed by Messrs. Cox & Stevens and Built by The Matthews Boat Co.

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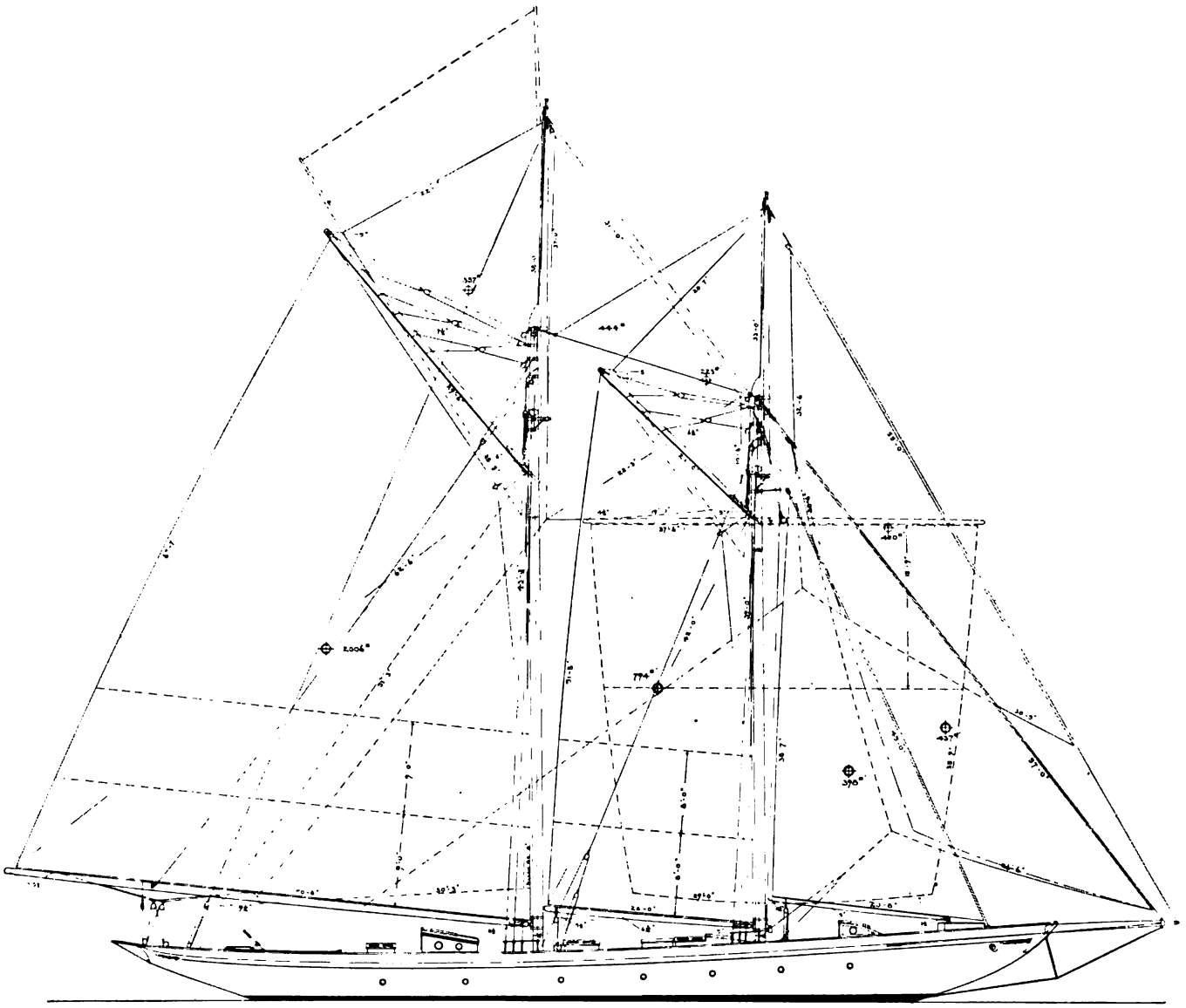

Sail Plan of Ninety-Foot Auxiliary Schooner. Designed by B. B. Crowninshield, Boston, Mass.

SEAFARER

THIS boat was built by Rice Brothers last Winter, and left Boston April 15th bound for San Francisco via the Mediterranean, Suez Canal, Indian Ocean and across the Pacific. The first stop was made at the Western Islands. Mr. L. A. Norris, the San Francisco owner, intends to take it easy, and is planning to reach San Francisco not sooner than six or seven months from now.

Mr. Norris has had quite a sea experience, having left home when sixteen years old and having served as second mate on British, German and American square-riggers. He made several voyages to the East Indies and has twice been around Cape Horn. Besides this he had two years at the Naval Academy at Annapolis, so he is well equipped to know pretty nearly what he wants.

As will be seen by the plans Seafarer is substantially but not enormously heavily built. She has 12 tons of lead on her keel and about 20 tons of inside ballast, including two tons of lead in small pigs and about 18 tons of cement and iron, cemented into her bottom. Her water tanks hold 1,200 gallons, and she carries 1,200 gallons of gasolene in three tanks in the lazarette. Auxiliary power is furnished by a 30-h.p. four-cylinder, four-stroke Boothbay engine, which gives her a speed of about five miles in calm weather. In addition to her fore-and aft canvas, she is fitted with a squaresail and raffee, as indicated on sail plan.

Although her profile shows quite long overhangs, the water-lines are sharp and the sections in each end decidedly V-shaped.

Besides the compass in the binnacle, she carried a second compass on a shelf in the after end of the companionway to port, and the compass is so situated that the bearing of the ship's head can be read from both cards at the same time.

On this trip she carries two fishing dories and a 16½-foot power boat.

General dimensions are:

Length o. a.	91	feet	6	inches
Length w. l.	64	"	0	"
Breadth	19	"	0	"
Draught	11	"	6	"

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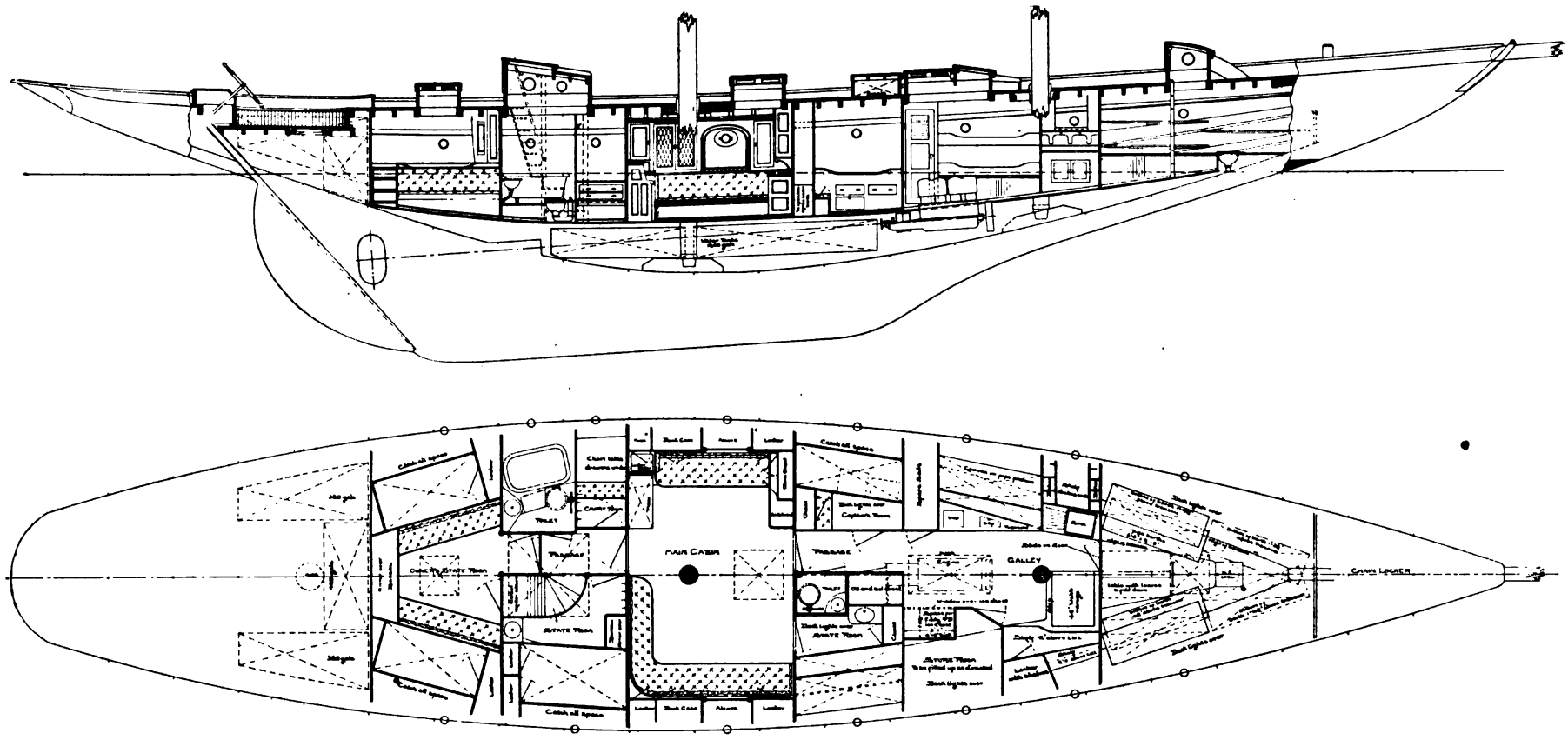

Cabin Plan of Seafarer

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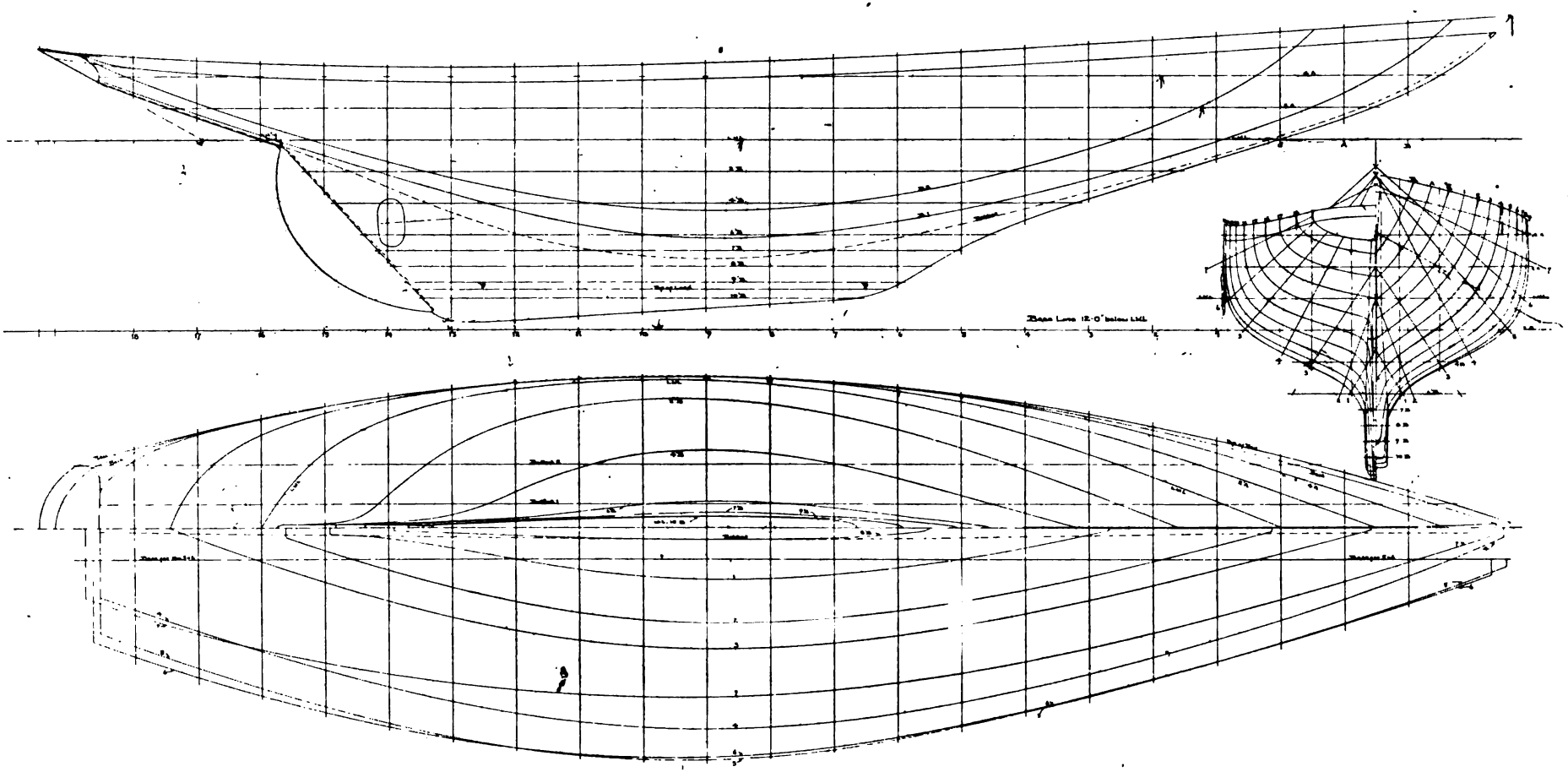

Lines of Seafarer

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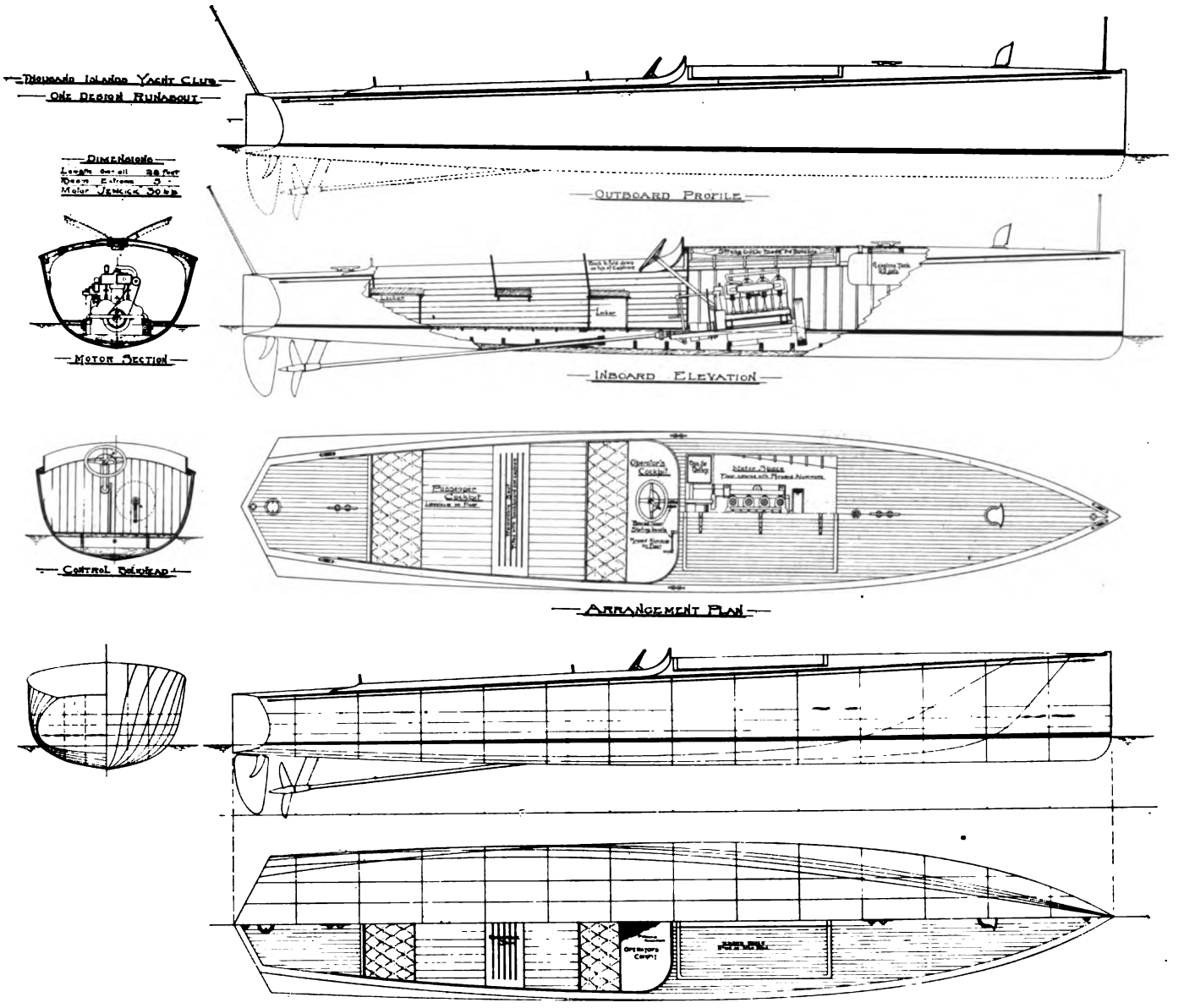

Thousand Island Y. C. One-Design Class. Designed by C. D. Mower, New York City

THOUSAND ISLAND Y. C. ONE-DESIGN CLASS

After the Regatta Committee of the Thousand Island Y. C. had decided upon the size and type of boat which it was deemed desirable to adopt as a one-design class for the clubs on the St. Lawrence River, in the neighborhood of the Thousand Islands, the invitations were issued to the leading designers and engine builders to submit designs and proposals for the construction of the boats.

After due consideration of the designs submitted, the committee decided to employ the services of Charles D. Mower as naval architect to design and supervise the construction of the boats. The first design submitted by Mr. Mower was modified to some extent to meet the conditions of the river, and the design finally accepted is, as the accompanying plans show, a runaboat type, 28 feet over all, with more breadth and freeboard than the average boat of this size and type. The breadth of 5 feet will make a very able and comfortable boat, and the high freeboard with a good flare on the forward sections will make her a dry and able boat. Below the water-line the design shows speed-boat lines with a fine entrance and a wide flat run aft, which will prevent settling by the stern when driven at full speed. At the extreme stern the bilges are well rounded in order to improve the steering qualities when running with a following sea. The sheer line is straight and the freeboard is 2 feet 8 inches at the bow and 1 foot 6 inches at the stern.

The arrangement of the interior shows the engine installed under the forward deck, which runs back in an unbroken line with a high crown to the forward end of the operator's cockpit. Access to the engine is given by two hinged hatches, which are flush with the deck when closed and are fitted so as to be water-tight. The cockpit has three cross seats, the forward seat being permanent with lockers fitted under it. The after seat is also permanent with a locker underneath, and the middle seat is made so that it can be easily removed when it is not required. The back boards to the two forward seats are hinged, so that they fold down on top of the cushions when necessary to allow any one to step over them in passing forward or aft.

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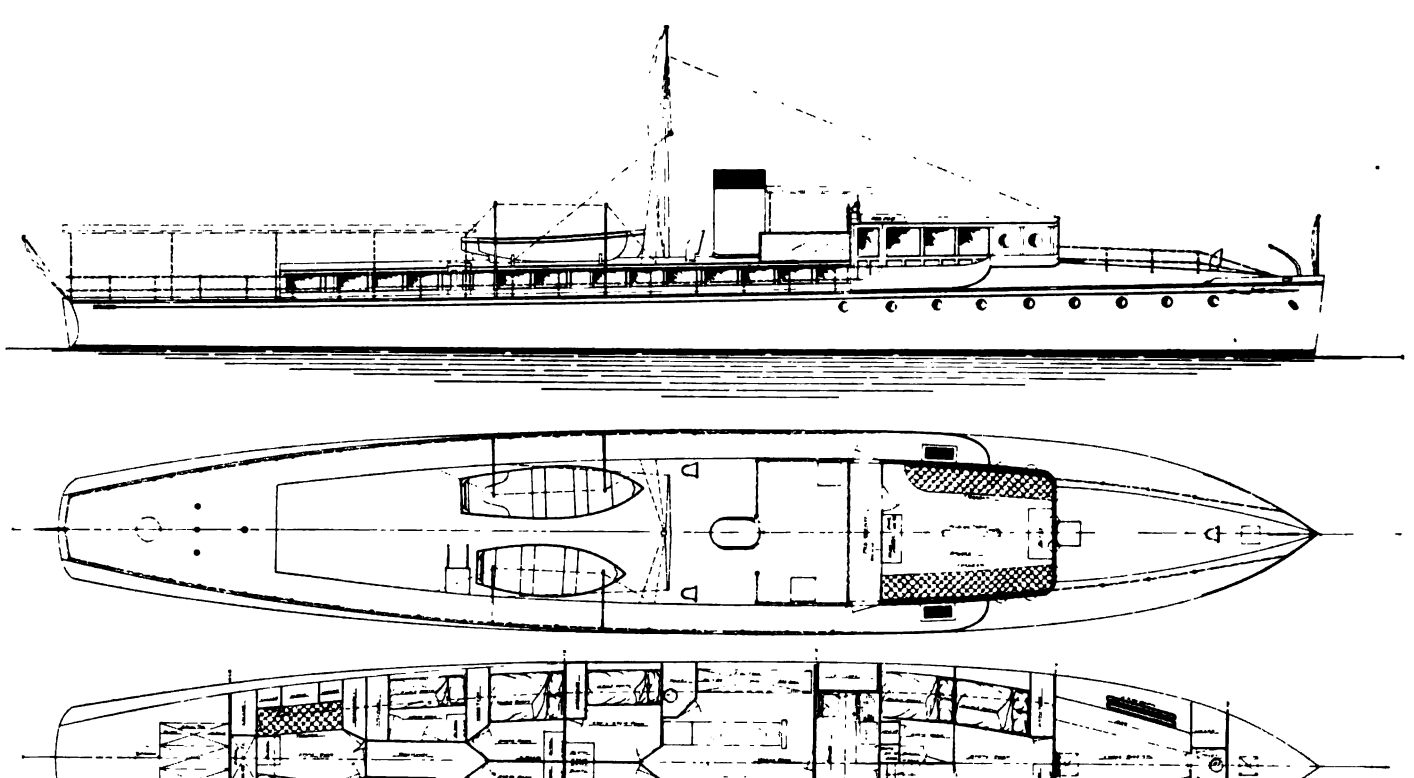

One-Hundred-and-Ten-Foot Cruiser. Designed by Morris M. Whitaker, New York City

The construction calls for the best materials throughout with oak keel, stem and frames; cedar planking copper fastened; and mahogany finish. The decks are entirely of mahogany and the cockpit coamings and all interior work are mahogany. The floor of the cockpit is covered with linoleum, while the floor of the operator's cockpit and the engine compartment is covered with pyramid aluminum. All fittings are of polished brass of special design.

The engine decided upon by the committee after a thorough and careful investigation of the best engines in the market suitable for this type of boat was the Jencick 30-h.p. four-cylinder engine. The engine is made of the best materials obtainable in every detail and the equipment is the best obtainable. Double ignition is used with a Bosch low-tension magneto with magnetic plugs and a secondary system with storage battery. The steering wheel is mounted on the engine and the spark and throttle controls mounted on the steering wheel. Both the starting crank and reverse lever are aft of the engine bulkhead. The gasolene tank is located forward of the engine and hung from the deck beams so as to insure a flow of fuel to the carbureter without air pressure.

The contract for the construction of the boats was placed with the Leyare Boat Works, of Ogdensburg, N. Y., and provides for twenty boats, which have been subscribed for by yachtsmen summering on the river.

The intention was to produce a boat that would be serviceable for general runaboat work; one that would be dry and a good sea-boat and at the same time have speed enough to make interesting class racing Wednesday and Saturday afternoons throughout the season.

ONE-HUNDRED-AND-TEN-FOOT CRUISER

THE 110-foot high-speed cruiser illustrated above is a design just completed by Morris M. Whitaker, of New York, and shows a form along modified torpedo-boat lines, so designed as to be capable of cruising anywhere along the coast.

It will be noted that a turtleback deck is used forward and the forward end of the pilothouse is equipped with ports instead of windows. The pilothouse is intended primarily as a deck saloon and is entered from either side through a passageway, from which stairs lead to the owner's accommodations below. These consist of a double stateroom the full width of the boat, bath and maid's room, immediately abaft of which is the galley extending the full width of the boat, and serving the dining saloon above through a dumb-waiter. Provisions are made in the galley for a hot-water system for the baths. Abaft of this is the engine room equipped with two six-cylinder 150-h.p. engines, and aft of this is the captain's and engineer's stateroom. The after end of the deckhouse is taken up by one large double stateroom, extending the full width of the ship, and two double staterooms at the forward end of these quarters, connected by a sliding door, and a single stateroom and large bath, the crew's quarters being located under the turtle-back forward.

The boat is designed to be electrically lighted throughout, and if so desired, hot-water heat can be supplied for all quarters. The dimensions of the boat are:

Length o. a.	110 feet 0 inches
Breadth	17 " 0 "
Draught	4 " 0 "

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THE RUDDER

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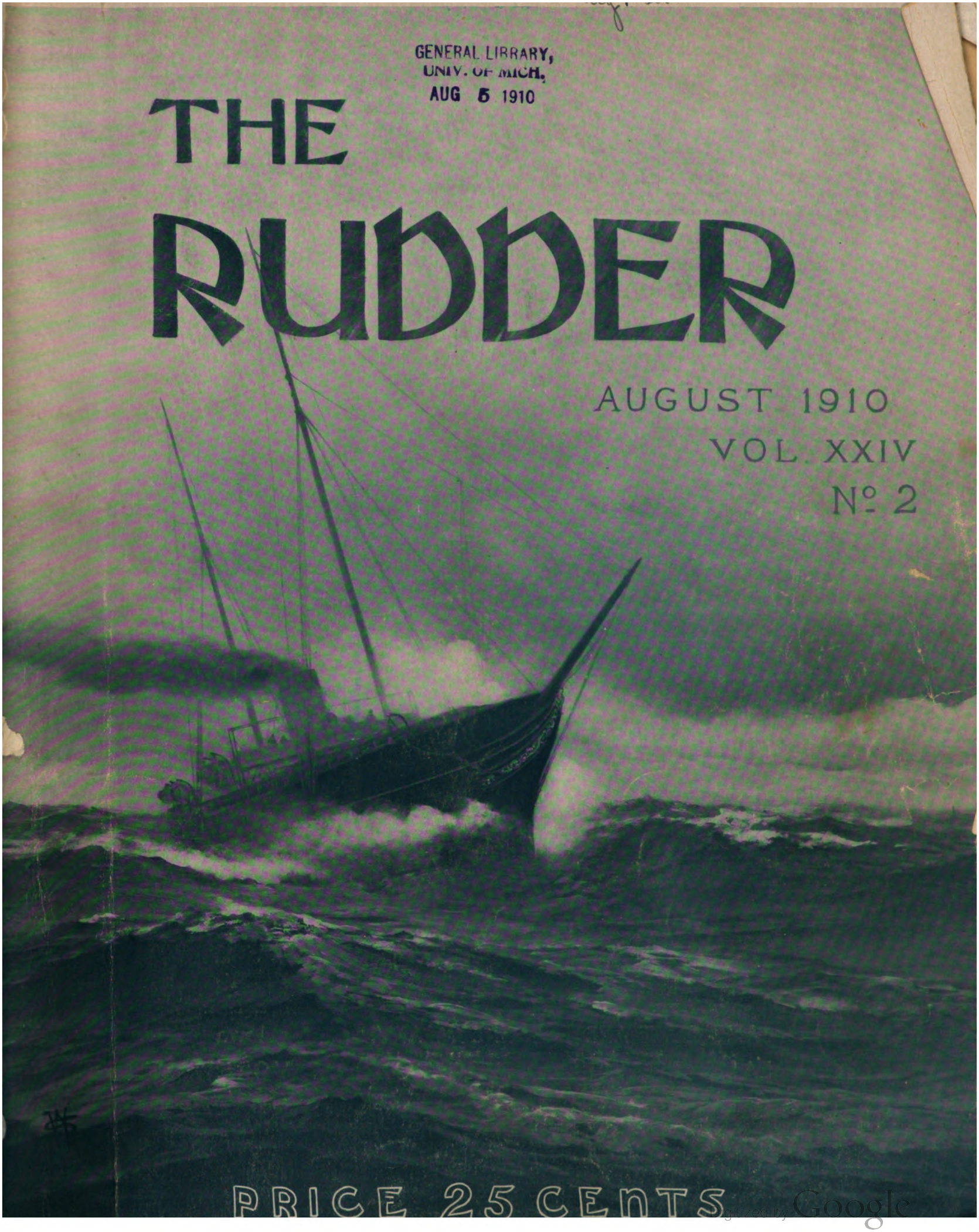

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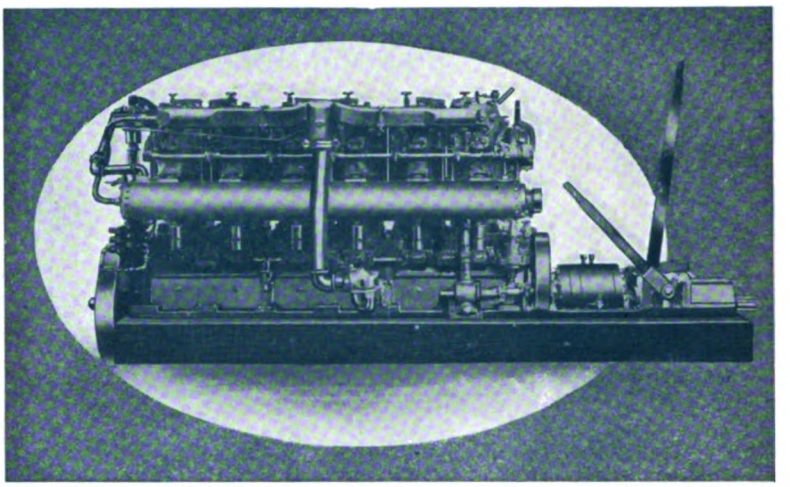

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Corona, N. Y.,
November 2d, 1909.

Lamb Engine Co. of New York,
No. 30 Church Street, New York City.

Gentlemen:—You ask me about my trip from Chicago to New York, more than 2,000 miles, in my launch "White Rat," in which I have installed a "12-H.P. Lamb Motor."

As you know, I have no hands or arms, and operate the boat and motor with my feet. As far as the running of the motor is concerned, I may just as well have been without my feet, as it invariably started on the switch after lying idle over night, and there was nothing to do but to keep sufficient oil and gasolene in tanks.

The best I can say is, "That I believe the 'Lamb' is by far the best of all marine motors, and when used by people with ha ds and arms it will never be out of commission."

With best wishes, I beg to remain,
Yours very truly,
CLARE A. LUTZ.

ACCESSIBILITY

The illustration shows Mr. Lutz, a Lamb engine enthusiast, who has recently made a 2,000-mile trip with a 12-H.P. Lamb engine, and being unfortunate in not having hands or arms was able to take down his Lamb engine without aid owing to its accessibility.

We honestly believe no other engine could meet this test, and it proves conclusively that the Lamb engine is as **simple and accessible** as it is **possible to make a marine engine.**

Mr. Lutz says the engine showed absolutely no wear in any part after the long trip.

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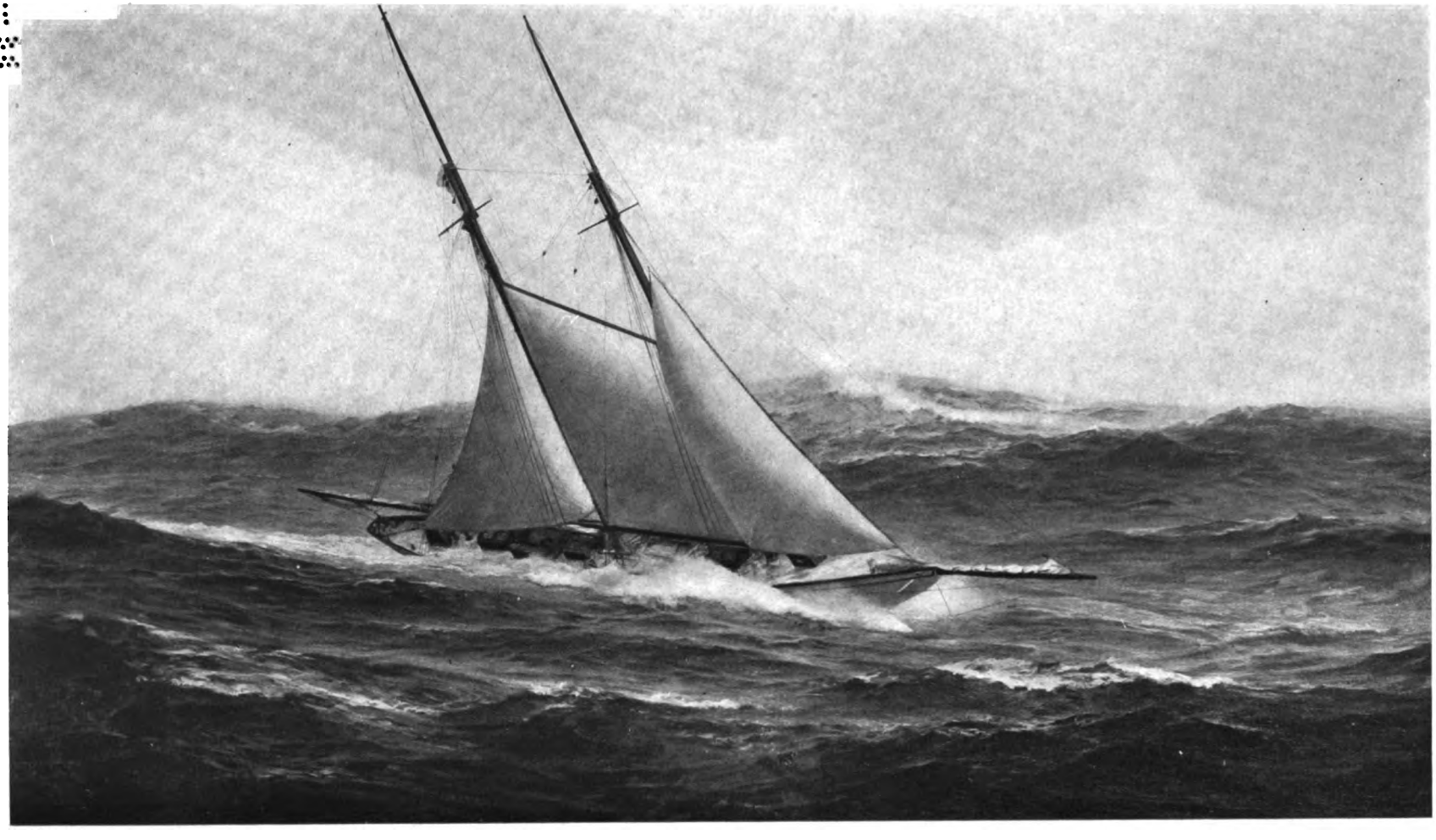

Venona in the Gulf Stream

From an original painting by Warren Sheppard in the possession of E. J. Bliss, Esq.

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The Rudder

Edited by THOMAS FLEMING DAY

Vol. XXIV AUGUST, 1910 No. 2

OUR COAST LIGHTS

F. Nichols

FROM the St. Croix River, Maine, to Padre Island, Texas, the Atlantic and Gulf coasts of the United States are dotted with some fourteen hundred lights, including lighthouses, beacons, lightships and buoys.

The first lighthouse built and operated in the United States was the stone tower erected on Little Brewster Island, Mass., in 1716 and called Boston Light. Sixty-seven years later it was rebuilt, the tallow candles were succeeded by fish-oil lamps, which in turn were replaced with more modern lighting apparatus.

The two oldest original lighthouses now in service are the stone towers at Cape Henlopen, Del., and Sandy Hook, N. J. These two were both built in the same year, 1764, and with a few minor changes inside and the French lens and mineral oil lamps in place of the clusters of old copper lamps, these structures are nearly the same as when first built. The octagonal sides of the Sandy Hook tower have replastered indentations which history tells us were produced by the solid shots fired from the guns of British frigates in 1777 in an effort to destroy the light tower that was established under the jurisdiction of New York thirteen years before.

The character of our coast-line is a varied one, from the rocky bluffs of New England, the wooded hills of New York and New Jersey, the low wind-swept beaches from Currituck to Cape Fear, the coral reefs and white sand keys of Florida to the bayous and marshes on the Gulf coast.

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To suit these conditions of coast formation different types of lighthouses are employed. Short, chunky stone towers are built on the high headlands, lofty needle-like shafts loom up on the low sand beaches, spider-shaped beacons on screw piles in the sounds and inlets of the Atlantic coast, and on the marshes along the Gulf borders, while the great skeleton structures stand on the coral reefs of Florida and at the mouths of the Mississippi.

The lights are rated in orders which indicate the size and type of illuminating apparatus. For instance, the seacoast or primary lights are generally of the first and occasionally second orders, having the largest and second largest size of cut-glass lenses which surround a lamp containing three to five circular wicks.

Secondary seacoast lights are mostly those of the second and third orders, and are principally located at the entrance to important harbors, whose lenses and lamps are the same type, but somewhat smaller in size than the first orders.

Sound, bay, river and harbor lights are those of still smaller sizes and various types of lamps and lenses, and are classed as fourth, fifth and sixth orders, range lens post lanterns, lens lantern and locomotive headlights.

A first order lens is a magnificent creation of cut-glass prismatic rings set in a polished brass frame, is 6 feet in diameter and stands about 12 feet high.

The best lighthouse lenses seem to be produced only in France. The British lighthouses, however, are fitted with those made in England.

The object of the lens is to bend the diverging rays of light from the lamp to horizontal lines thereby sending out the full power of the light, which is further increased by a silver-plated reflector door placed at the back of the lens.

First, second and third order lamps are what are termed plunger or air pressure, and in the case of the plunger lamps have a reservoir with a leather packed

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piston with weights on top which forces the oil through a pipe into the float chamber, from which it is fed to the wicks encircling each other. The float regulates the amount of oil supplied to the wicks, automatically shutting off when a surplus amount is received from the reservoir, and again opening when it falls below the required level. Attached to and fitting over the chimney top is a brass tube resembling a stove pipe and running clear to the lens top. This tube is fitted with a damper by which the flame of the wicks is regulated. When properly adjusted by the regulator the chimney is filled with a bright flame.

The least change in atmospheric conditions has an immediate effect on the action of the flame, such as the approach of damp weather, which causes the flame to rise and threaten the melting of the chimney. This frequently happens in the first order lighthouses when the heat from the flame proves too much, and specimens are on view in lights of misshapen lumps of glass that were once chimneys. It is for this reason that keepers of first and second order lights are required to stand their watches in tower watch-rooms throughout the night.

In most of the lights mineral or kerosene oil is the illuminant used. Compressed acetylene gas is now used in some lights, principally those of low orders, post and lens lanterns and lighted buoys. Within the last few years a new system of lighting called incandescent oil vapor, has been installed in a number of lighthouses on the Atlantic coasts. Kerosene is also used in this new type of lighting apparatus, and is forced by air pressure through a vaporizer into the burner in a gaseous form. A gas mantle is fitted to the burner and an intense white light is produced which surpasses the incandescent electric light in brilliancy.

The most powerful light and highest from the sea level on the Atlantic coast is the great electric flash-light on the wooded hills of Navesink Highlands, N. J. This light, or its focal plane, which is the center of its lens, is 250 feet above the sea, and its flash is visible 23 miles away, but the beam is projected beyond the horizon and is often visible many miles before the flash comes into view.

Its lens is termed a bivalve somewhat resembling huge glass saucers, with an arc light between them. This immense lens is supported on a float which revolves in mercury, thereby reducing the resistance of friction to a minimum.

On very dark nights the light resembles a search-light, throwing a long white beam around the horizon, making a revolution every ten seconds, but showing a flash 1-10 of a second long every five seconds, as the light shows through both sides of the lens. The flashing effect is produced by the focus, which lasts about 1-10 of a second to an observer.

First order lights are generally located at isolated points on the seacoast, or coral reefs or sea rocks, are usually of a height of from 125 to 180 feet, and whose lights are seen at distances from 17 to 20 miles. Second and third order lights are less lofty structures and are principally near harbor entrances where the longer range lights are not required.

The smaller order of lights are used on structures termed beacons and are stationed in or on sounds and bays, while the lens and post lantern guides are in or on the banks of rivers and small lakes. Range lights are those which mark the axis or center line of a channel and consist of two light towers of different heights, distant from each other one-fourth to a mile and arranged in line with the channel axis. The front light is lower and usually less brighter than the rear light.

A vessel steering a channel course keeps the bright or rear light over the front light. By so doing a perfectly straight course is kept in the center of the channel and maintained until other lights or marks come in range for a change of course.

The characteristic of a light means of what color and whether fixed or flashing, the length in time of its flash and interval and number of flashes.

Some lights indicate by flashes a number, such as Cape Charles Light on the coast of Virginia, which signals by flashes the number 45, as follows: 4 flashes, eclipse 6 seconds; 5 flashes, eclipse 32 seconds, and so on.

Other lights are fixed, showing a steady red or white light or both, depending on what points the light is viewed from. Some are fixed, varied by a flash or number of flashes, of either color or both.

Still others are flashing red, white, red and white of so many seconds' duration of flash, number of flashes and duration of eclipse.

Some lights have dark sectors arranged to obscure the light from a given point so as not to conflict with other lights that may be visible from this point. There are others fitted with red sectors, so arranged as to cover dangerous reefs, and the limit of safety is reached when the edge of the red sector comes into view.

In order to further distinguish different lights, some are arranged in groups of two or three separate light towers. Among the groups of two are the Cape Elizabeth Lights on the Maine coast, and the lights of Cape Ann, Mass. There is one group of three towers on the high bluffs at Nauset Beach, on the same coast.

The difference in type and color of lighthouse structures further distinguish them as day-marks, which materially aids the navigator in locating his position at once.

Of the great number of lighthouses along and off our coasts there are hardly two stations of a similar nature in regard to build and color, and with some exceptions alike in characteristics, and this only in the case of fixed lights. Thus is understood the variety of tower and lights that mark our coast-line.

The Graves, Massachusetts Bay

Illustrations from Stebbins' Coast Pilot

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Cornfield Point Light-Vessel Long Island Sound

This is necessary in order to prevent misunderstanding as to what light the mariner has in view. If in the daytime his vessel comes in sight of land and he observes a tall shaft,colored in black and white spiral bands, red brick base and a black lantern, he knows that this light is Cape Hatteras, and that he is in the vicinity of the dangerous Diamond Shoals, which run off 10 miles from the coast. At night he distinguishes the light by its bright white flash every ten seconds, 20 miles away. Further South he brings into view 18 miles from him a fixed white light of the first order, and he knows that this is Cape Lookout. If daylight reveals this tower to him he will notice that it is colored in black and white diagonal checkers, and surmounted with a black lantern. Cape May Light is a tall gray tower with a red lantern. Barnegat Light, half red and half white, with a black lantern. Others are brown, black, red or white, black and white horizontal bands, and numerous other arrangements of colors so as to indicate at once what particular light is in sight.

The navigator of a coastwise vessel is not only familiar with individual types of structures, but his practised eye takes in all the peculiarities of the vicinity of the lights.

The rocks of Matinicus, the bold bluffs of Gayhead, the high white sand-hills of Capes Henry and Henlopen, the flat narrow strips of the Carolinas, and the almost submerged Keys near the edge of the Gulf Stream all serve to assist in fixing the identity of the different light-stations.

The types of lighthouse construction are quite as varied as the characteristics of the lights and the colors of the towers. The principal reason for this is on account of the nature of the lighthouse site. On firm ground and offshore rocks lighthouses are usually built of brick, granite or iron plating. Large lighthouses on unstable ground and coral reefs are of skeleton steel structure built on iron piles, standing in from 2 to 5 feet of water. On these offshore stations the keepers' quarters are located in the lower part sufficiently high to be out of reach of heavy seas; a central stair cylinder rises to the watch-room, where the night watch is spent by the keepers, and directly above this is the huge glassed-in lantern containing the lens and lighting apparatus.

Lighthouses built offshore on sand bottoms have a concrete foundation laid by means of a caisson, a method now generally used, as most heavy buildings in large cities have their foundations built in that manner. The caisson is sunk to a depth until a firm bottom is reached, when the concreting begins. An iron cylinder rises from the caisson top and on this is built the lighthouse proper. In other places, such as Chesapeake Bay, Albemarle and Pamlico Sounds, a screw-pile foundation is used where the water is comparatively shallow. These piles are worked into the soil in the same manner as a screw until a solid bottom is reached. On these are built the lighthouse structure, generally a one-and-a-half-story square or octagonal building, which constitutes the keepers' quarters, with the lantern on top of this. These light stations are usually fitted with the smaller sizes of lights as fourth, fifth or sixth order, as the range required in those places is short. The fog-signals for these stations consist of machinery-struck bells or third class compressed or hot-air trumpets. Pile clusters in shallow bays and rivers and posts on the banks of rivers support lens and post lanterns.

The post lanterns are principally used at the numerous bends on the banks of the Mississippi and Ohio rivers, and very often a convenient tree serves as a support for these lights.

An example of an offshore rock lighthouse is Minots Ledge Light, built on one of the Cohasset Rocks, off the entrance to Boston Bay. This light was built under great difficulties in 1860-'65 and from the exposed nature of the rock and the dangers and difficulties attending its construction it is classed among the great rock lighthouses of the world, and is often referred to as the American Eddystone. The rock was barely dry at low water, and this had to be leveled and dovetailed to receive the granite courses, between tides, and the work was frequently interrupted by storms which drove the workmen from the rock. When the rock was leveled it was 9 feet below high-water mark. A 90-foot granite tower was built on this with the entrance door about halfway up the tower. The boat davits are placed on the lantern deck, which means a clear hoist of about 85 feet. This light is equipped with a second order flashing white light and signals the number 143. Four keepers are attached to this light—two on leave ashore and two on duty at the light.

Among the large offshore lights of the skeleton steel construction, and built on the pile foundation, are Fowey Rocks, Carysfort Reef, Alligator Reef, Sombrero Key and American Shoal. While these towers are of the same type of construction, a variation of form of several parts of the towers acts as a distinction mark for daytime in order to reveal the identity of the light-tower. These stand in shoal water on the coral reefs off the coast of Florida, are of the first order, stand from 100 to 150 feet high, and their bright fixed or flashing lights are seen 16 to 18 miles away.

The tallest lighthouse shaft on our Atlantic or Gulf coasts is the lighthouse on the low wild sands of Cape Hatteras, and stands nearly 200 feet high. A light of the first order shows a flash across the treacherous shoals that extend 10 miles from the beaches.

The next tallest light-towers are the skeleton iron structures at Hog Island and Cape Charles on the Virginia coast. These are usually described as square, pyramidal iron skeleton towers, with a central shaft containing the spiral staircase. This type of tower is

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identical with the Florida reef lights except as to foundations and keepers' quarters. On shore, where room is available, detached buildings are provided for the keepers' families. The offshore stations have the keepers' quarters contained within the structure, and on the larger light stations the families of keepers are not allowed to reside on the light.

Many of the Southern lighthouses stand on the low, hard white sands, a few feet above the sea level of the Florida beaches, or on the Keys, small narrow islands of coral and sand to the southward of Florida, and are monuments of lighthouse construction. Among these is the lofty brick tower of St. Augustine on Anastasia Island, with black and white spirals; (the same color as Cape Hatteras tower except that the lantern is red in color) and whose light is a fixed white varied by a flash every 3 minutes.

Another is the black and white tower of Dry Tortugas on Loggerhead Key, a white sand strip 700 feet wide and about a half mile long situated 100 miles from the Florida coast. Its light, of the first order, gleams across the waters of the Gulf of Mexico.

Of the oddly constructed towers, the 130-foot triangular pyramidal skeleton at Paris Island, S. C., is the most noticeable. Its big locomotive headlight is housed during the day at the base of the structure, and toward sunset it is hoisted by machinery up the slanting rails to its position at the apex of the tower. The upper part has lattice work built on one of the sides, which serves to distinguish it as a day-mark.

Light stations are generally regarded as located beyond the pale of habitation, but a few find their positions close to the edges of cities and towns, and in some cases actually within the city limits.

Among the beacons out of the ordinary as regards type and location, is the reflector light on the top of the white steeple on St. Phillip's Episcopal Church, situated in the heart of the city of Charleston, S. C., which serves as a rear range for the channel in Charleston Harbor.

Others are the ordinary street lamp placed on top of a manufacturing building in New Bedford, Mass., also used as a range in connection with a regular beacon light; and the white mast located at the corner of O and East Seventh Streets, in the city of South Boston,

Sabine Bank, Gulf of Mexico

which shows a red electric reflector light as a channel guide in Boston Bay. Another is the red light shown from a white column in Commerce Street, Cambridge, Md.

Some light stations are also bearers of odd-sounding titles, among them being Bald Head, Burnt Coat Harbor, Devils Elbow and Brandywine Shoals.

Another type of structure is the conical iron-plated sectional tower at Hunting Island, S. C. This was afterward taken apart, removed further inland on account of the encroachment of the sea, which threatened to undermine the foundation, and was rebuilt in the same manner as before. These iron towers are brick lined and fitted with the usual winding stairways and landings.

Most of the towers and dwellings of stations on the New England coast, where the snow-storms and Winter gales are especially severe, are connected by covered ways, so that journeys to the lights are made without exposure to the storms of these rocky coasts, while some of the stations on the beaches from Barnegat to Hatteras have sand breaks to ward off the drifting sand-storms which sometimes blow like those on the desert, piling sand to the second stories of the dwellings during the windy season, burying the walks four and five feet deep, and blocking the entrance doors of the light-towers. The dwellings at Barnegat, Henlopen and Hatteras are half-hidden from view by the surrounding sand piles.

All lights are promptly lighted at sunset of each day and kept going full glare throughout the night until sunrise, whether the night be moonlight, foggy or snow-storms prevailing. It burns steadily without interruption, and with slight stops when winding the clock-work mechanism of flash lights, it revolves regularly.

After sunrise the duties of the keeper consist in preparing the lighting apparatus for the succeeding night's work, by rubbing off the crust formation on wick tops until smooth and level again, the cleaning of the float strainers, refilling the oil reservoir, wiping and oiling the revolving mechanism, polishing the lamp brass work, ventilators and reflectors until they resemble mirrors, and rubbing down the crystal prisms of the big lens with chamois skin which brings out the colors of the rainbow. The deep plate-glass lantern windows are polished with linen towels, the sashes, domes, decks and stairways dusted and swept. All tools and utensils are arranged in the most neat and systematic order. In fact, nothing can be found to excel the cleanliness and order of the lighthouses on our coasts. A huge linen hood is then passed over and envelopes the lens, the buff-colored lantern curtains lowered and the tower duties are over until sunset.

In very cold weather the heated vapors caused by the great lamps condense and would form in clouded ice-sheets on the inside of the lantern windows, and seriously interfere with the light being seen at sea with its full power. This is overcome by the use of pure glycerine, which is applied over the surface of the windows, thereby preventing the condensed vapors adhering to and freezing on the glass. Occasionally throughout the night the keepers apply the glycerine coating, which enables the light to be seen at its usual brilliancy.

First order double lights generally have four keepers; first and second order, three keepers; third order, two; fourth order, with fog-signal of the first or second

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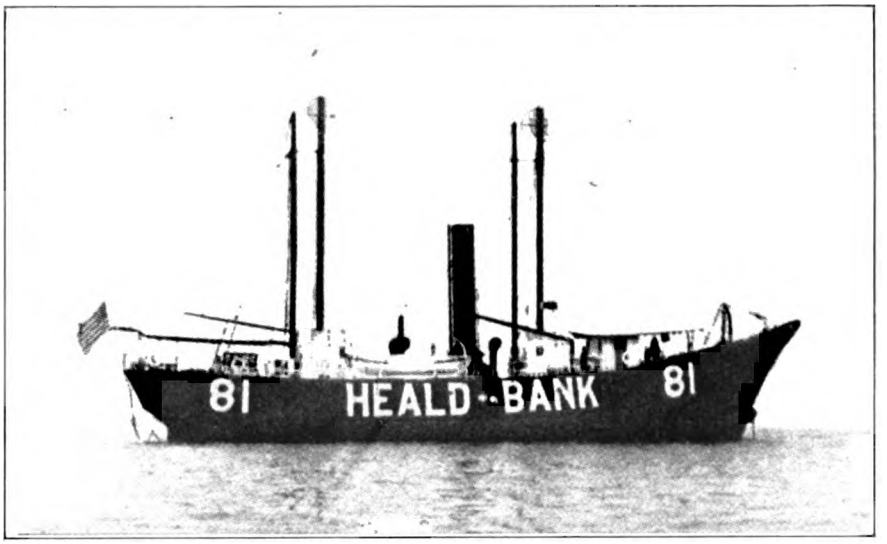
classes, two keepers; fourth, fifth and sixth orders, with or without fog-bells, are usually one-keeper stations.

During the long, dreary Winter months most of the big stations are cut off from the outer world and the keepers' families lead a somewhat secluded life. But those snow-clad wastes seem to have the same fascination for them that most polar explorers experience when the "Lure of the North" beckons them to the ice caps of the polar regions.

The cozy, comfortable dwellings with their tastily arranged interiors and furnished with Government libraries and other literature donated by thoughtful friends, serve to offset this apparent loneliness, and the average light-keepers manage to remain a contented lot despite their seemingly adverse surroundings.



Heald Bank Light-Vessel, Gulf of Mexico

In 1891 an attempt was made to build a lighthouse on the shoals off Cape Hatteras. A caisson was built and towed to the site, sunk to the sands and preparation made for the excavating and concrete filling. Before the work had progressed to any extent, the shifting nature of the sand bottom gave trouble and a short time afterward a severe storm arose and completely destroyed the caisson, so that further work on the structure was finally abandoned.

Previous to the attempt to build a tower on those treacherous sands, efforts had been made to maintain whistling buoys near the shoals as a warning of the dangerous neighborhood. Buoy after buoy was reported missing, so that heavier chains and anchors than had heretofore been used were attached to the new ones. These were also reported missing, and the attempts to maintain buoys as markers of the shoals were abandoned. It happened that these heavily chained and anchored buoys were never afterward recovered, and a mystery seemed to surround their continual disappearance. This mysterious behavior was, however, solved by the report of a passing vessel that the top of the whistling buoy on the Diamond Shoals was observed to be barely visible above the waves.

The reason was now apparent for the complete disappearance of the buoys; to keep the moorings from parting and the buoy drifting away, they were made so heavy that they gradually sunk into the quicksands, dragging the entire buoy beneath the waves, and finally disappearing below the surface of the shoals. So where these quicksands exist that prevent the erection of a lighthouse, or the mooring of buoys, resort must be made to the use of lightships.

About thirty-five of these vessels are stationed at points off our coasts from Maine to Texas. Most of them mark the vicinity of dangerous shoals, while a few mark the approaches to important harbors. They are exceptionally seaworthy, with high freeboard and fitted with propelling machinery. Their engines are brought into use in very heavy weather to ease the strain on the mooring cables, or to enable them to return to their stations in the event of breaking loose. To hold these vessels in position huge saucer-like anchors called mushrooms are used. Extra heavy chains lead from them to a hawse-pipe fitted in the stem of the ship a few feet above the water-line and slanting upward, where it is secured to a spring arrangement which prevents a violent straining on the anchor chain. Light-vessels are fitted with two masts from which are displayed their reflector lights.

Some of the vessels show electric arc or incandescent lights, while others have the oil lamps. Some have two fixed white, two fixed red, flashing white and fixed red, one flashing white, one fixed white, one fixed red, fixed red and white, while the lightship off Cape Hatteras has a searchlight on the main deck showing a white beam at an angle of 45°, and always pointing to the eastward. In addition to this she has two regular flashing arc lights at the mastheads.

They are distinguished in the daytime by the different colors of their hulls, with their names and numbers painted along their sides, and usually have a circular cage-work day-mark at one or both mastheads, to indicate that they are lightships.

They are provided with 12-inch steam whistles to be sounded during fogs and snow-storms with blasts at regular intervals; some have submarine bells which transmit the sound through the water to other vessels fitted with submarine receiving apparatus, while others are equipped with the wireless telegraph.

The lightship moored off Brenton Point, R. I., is described as two-masted, circular cage-work day-mark at each masthead, straw-colored hull, with "BRENTON REEF NO. 39" in black on each side. Black smoke-stack and two whistles between the masts.

The one at Shovelful Shoal is two masts, red hoop iron day-mark at mainmast head, black hull with white stripe, "SHOVELFUL" in black on each side, and "3" in black on each quarter.

Some of the vessels have odd-sounding names, such as Handkerchief, Hedge Fence, Hen and Chickens, Frying Pan Shoals, etc.

Lightships such as the Diamond Shoals off Cape Hatteras, and Nantucket Shoals off the Island of Nantucket, are moored from 5 to 14 miles from the spots that they are supposed to mark. This is done in order to secure a suitable anchorage, which is in water not less than 180 feet deep. To moor nearer the shoals would mean to ride in breaking seas and increase the danger of breaking loose or foundering at the anchors.

The Diamond Shoals ship has frequently parted her moorings and on one occasion blown ashore during a

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hurricane on to the beach of Hatteras. It necessitated the use of dredges to dig a channel from the beach to deep water in order to float her again. Owing to the dangers of this station, a reserve ship is always held in readiness at Norfolk, Va., ready to steam to the Diamond Shoals in case the regular light-vessel breaks from her moorings and becomes disabled, is blown ashore or to sea.

Nantucket is probably the most exposed station, being about 80 miles from the mainland and 40 miles from the nearest land, Nantucket Island. This is one of the most important lightships, as it is the first light sighted by the Westbound Atlantic liners, who lay a course from Europe to this vessel, and it is anxiously sought for by the steamers' lookouts when approaching this coast. This lightship is equipped with the wireless telegraph and transmits messages for all vessels that wish to be reported. It is the last light left astern by all the Eastbound ships.

The Winter seas of 1906-7 were so tempestuous on the Nantucket station that they proved too severe for the relief lightship which was doing station duty in place of the regular ship, which was off for repairs. The terrific laboring in the seaway and the violent straining at the chains caused the vessel to spring aleak. After several days and nights of desperate work by the crew to keep the vessel afloat, orders were given to make ready to abandon the ship, which was now beyond saving. She sank in deep water while the crew were hastily leaving to be rescued by a Government vessel which had been summoned to the scene by wireless dispatches, and thus another ship was added to the long list of Nantucket's marine graveyard.

One of the best known lightships which has been discontinued and is now a matter of history, was the Sandy Hook Light-Vessel, formerly stationed near what was called the bar, a shoal now since removed by dredging, off the entrance to New York Lower Bay.

This station was established 86 years ago, the oldest of our lightship stations, some 8 miles easterly from Sandy Hook, was the starting and ending mark for all the Atlantic liners who timed their voyages from Daunts Rock or Fastnet to Sandy Hook Light-Vessel, and was also used as the rounding or starting and finishing mark for all the international yacht races for the America's Cup.

Thimble Shoal Chesapeake Bay

This red-hulled ship was withdrawn and the Sandy Hook station abolished in 1908, to the intense regret of all navigators who had used this vessel as a guide in all weather when entering or leaving the port of New York.

A new lightship has been established to mark the entrance of the new Ambrose Channel, not far distant from the old position of the Sandy Hook, and this straw-colored steamer with the strange name in black on the new station is regarded with disappointed glances by those on the incoming vessels, who were wont to look for the faithful old red hull and the familiar name in large white letters of the Sandy Hook.

Another lightship of interest is the Scotland, anchored about 4 miles to the westward of the Ambrose and on the center line of the South Channel. When this ship was established in 1868, her station was to mark the wreck of the bark Scotland which foundered off Sandy Hook a few years before. Her name inscribed along her sides at that time was "Wreck of the Scotland," but since then all traces of the sunken bark have disappeared, and the lightship was then withdrawn from her station. But the Sandy Hook pilots who had become accustomed to the use of the light-vessel as a general mark, entered a protest at the removal of the ship, so the Government restored her to the station soon after, and later shifted her position to the present one on the axis of the South Channel, and her name along her sides now appears simply as "Scotland."

This is one of the old type of lightship which will soon become obsolete and make way for the big, modern steam light-vessels that ride on the open sea, and outlive the worst of Atlantic storms.

Another ship of the old school is the Frying-Pan Shoals, No. 1, built in 1855 and moored off Cape Fear, being among the few lightships that are fitted with a bowsprit. Her station at one time was off the shoals of stormy Nantucket, now marked by that bulldog of lightships, No. 85. But her great age began to tell upon her, and the Government, fearing that she might not weather the fierce Winter seas of wild Nantucket, decided to relegate her to the less dangerous position that is now occupied off the coast to the southward of the Cape.

The monotony of life on board of lightships is broken by the varied duties, the changing of the weather, passing vessels, and the going of some of the crew on leave or their returning if the weather permits. Each member of the ship's crew, from steward to master, is allowed ten days' leave per month. The discipline in the Lighthouse Service is exact, and this is plainly shown on light-vessels where much danger exists owing to their exposed stations.

When signs of a hurricane are noticed the lightship cannot slip her cables and run for a haven like other vessels. Where the greatest danger threatens and every vessel in the vicinity is racing for a harbor, the lightship must remain on the open sea, while a chain link holds together. On the approach of dangerous weather orders are issued to increase the length of the mooring chain, which allows the ship more freedom to ride the seas; everything movable above and below decks is secured with extra lashings; the engineers stand by to start the propelling engines, and if a snow-storm is upon them the steam fog-whistle commences to sound off its dismal warning.

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Hillsboro Inlet, Florida

During these fierce mid-winter storms with the lightship buried in the tumbling seas, spray flying over the mastheads, the violent jumping of the ship, the screaming of the fog-whistle, the racing of the engines as the propeller is flung out of water, all this makes sleep almost impossible, and the entire crew is kept in a tension for days and nights at a time. Every sea shipped freezes as it strikes, coating the exposed part of the ship, and in eight to ten hours in a genuine Winter gale, the lightship resembles a diminutive iceberg with two flaming pinnacles. However, she proves a welcome warning to the storm-beaten ships that pass her way, and prevents their destruction on the seething shoals.

Some of the lighthouses are provided with fog-signal apparatus. The most important places have first class steam or compressed air sirens, or 10-inch whistles. The next stations have second or third class sirens or trumpets, or bells struck by machinery. A light station situated on an island generally has a 10-inch whistle in order to have the sound directed all around the vicinity of the island.

Stations on the mainland have the siren or trumpet which projects the blast offshore. The smaller stations have the lower class of trumpets and machinery struck bells with different characteristics. For instance, the 10-inch steam whistle at Seguin Light on the Maine coast sounds during foggy weather with a blast 5 seconds long every 15 seconds.

The first class compressed air siren at Montauk Point, L. I., has 3-second blasts at alternate intervals of 3 and 31 seconds, while the machine-struck bell on Ship John Shoal, Delaware Bay, strikes a triple blow every 45 seconds.

Fog-signals of the first class which are operated either by steam or compressed air, are controlled by an automatic opening and closing device which determines the characteristic of the signal. This device consists of a vertical cylinder fitted with a piston and rod, the latter connected by levers with the whistle or siren valves. A spring clock-work motor revolves a cam wheel which raises a small piston valve admitting steam or compressed air to the cylinder. The cylinder piston now rises, pulling open, by means of the levers, the whistle valves, and the signal sounds its required blast. The small piston valve is now dropped by the cam wheel, releasing the steam or air from the cylinder, and the cylinder piston recoils by means of a spring to its original position, thereby shutting off the signal. The compressed air stations have kerosene-driven engines operating compressors, and the steam stations have locomotive-marine boilers. This machinery is arranged in double sets with their connections so arranged that in the event of several pieces of the apparatus becoming disabled the signal can be sounded as usual. If the automatic device and trumpet of one set becomes out of order, and the engine or boiler of the other set is under repairs, the cross connections permit the signal to be operated as before. This duplicate arrangement reduces the chances of the total disabling of the fog-signal during thick weather. Keepers at fog-signal stations who have in view other lights from 3 to 5 miles distant, use these lights as guides to determine when to start their signals at night. Otherwise it would be a guess work matter to know when some fogs exist.

At certain times of the year in some places, while perfectly clear on shore, dense fog-banks travel along the coast about one-fourth to a half mile from the land and this condition cannot be determined without some night-mark as a guide. When the lights offshore become obscured the fog-signal is started and kept sounding, sometimes several weeks at a time without interruption. The keepers relieve each other promptly and no stop is made to the blowing of the signal until the offshore lights again become visible.

This incessant blaring of a fog-siren on a lonely, isolated coast on a still night, with a low rumbling surf, creates a weirdness when first experienced. If distant high hills are in range of the whistle it echoes in a strange, mocking manner.

Other aids to navigation consist of acetylene gas lighted buoys whose large underbodies serve as storage tanks for the high pressure supply of gas, which is fed to the burners within the lens lanterns supported on the top of the buoy framework.

These have a capacity of gas sufficient for five or six months, day and night burning, and are used to mark the channels leading to harbors, shoal spots and sunken wrecks. Bell buoys are used as night and foggy weather guides within harbors and usually mark shallow water. They are fitted with a pyramidal skeleton framework above the buoy and support the bell which is rigidly fixed, and the four suspended hammers which strike the outside edge of the bell by the action of the seas.

Whistling buoys of the first class are large steel bulb-shaped buoys with a long steel tube about 2½ feet in diameter extending some 20 feet below the buoy bottom. A 10-inch whistle is attached to the buoy top and connected with a discharge valve and air pipe to the interior of the long tube. This tube is open at the lower end, and by means of an inlet valve placed at the top of the buoy and also leading to the long tube, air is drawn in through this valve as the buoy rises on the top of a wave, and as it drops into the hollow of the sea, the water in the tube acting as a stationary piston, and the tube a moving cylinder, this intaken air is compressed and forced through the discharge pipe at great pressure to the whistle at the top, producing a shriek that is heard 10 or 12 miles away. These buoys are principally placed in deep and rough water to guide clear of shoals at some distance from the land and are secured with heavy chains and large mushroom anchors.

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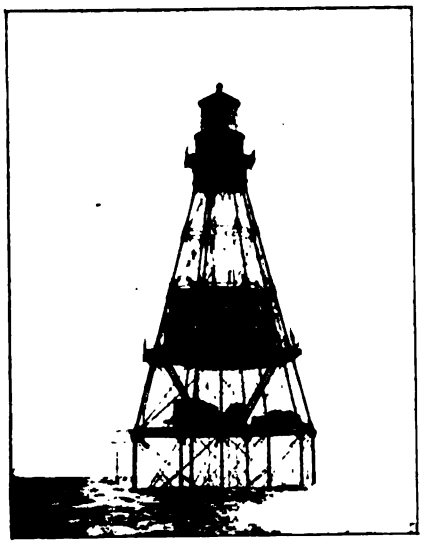
The turning points in channels are indicated by conical-shaped iron buoys surmounted by a cage-work ball. Those at channel junctions are the same type of buoy, with the exception that it is topped by a box-shaped cage-work mark instead of the ball. Ice-buoys are steel spar-shaped with several divisions below their water-lines which form water-tight compartments and prevent their sinking in case of puncture by collision.

At certain times each year all buoys have to be taken up to have their underbodies, chains and anchors scraped of the marine growth which clings to them in great clusters, are then repainted, and if necessary new chains and shackles are fitted to them. Some buoys receive



American Shoal, Florida

damage by collision with passing vessels, lose their cage-work tops by tow-lines of tugs, and drifting ice often sweeps over and buries them for hours or breaks their chains and carries them to sea.

In the placing and lifting of buoys, assisting light-ships to their stations and transporting supplies to light-houses, a fleet of tenders is maintained in each district. These vessels are powerful steamers equipped with modern hoisting apparatus for the purpose of lifting the immense buoys and their anchors.

During the Winter months the work of the tenders is especially severe and exacting. The heavy buoys dragged or broken from their positions by the floating ice have to be recovered, new moorings attached, and replaced in their correct position by magnetic bearings.

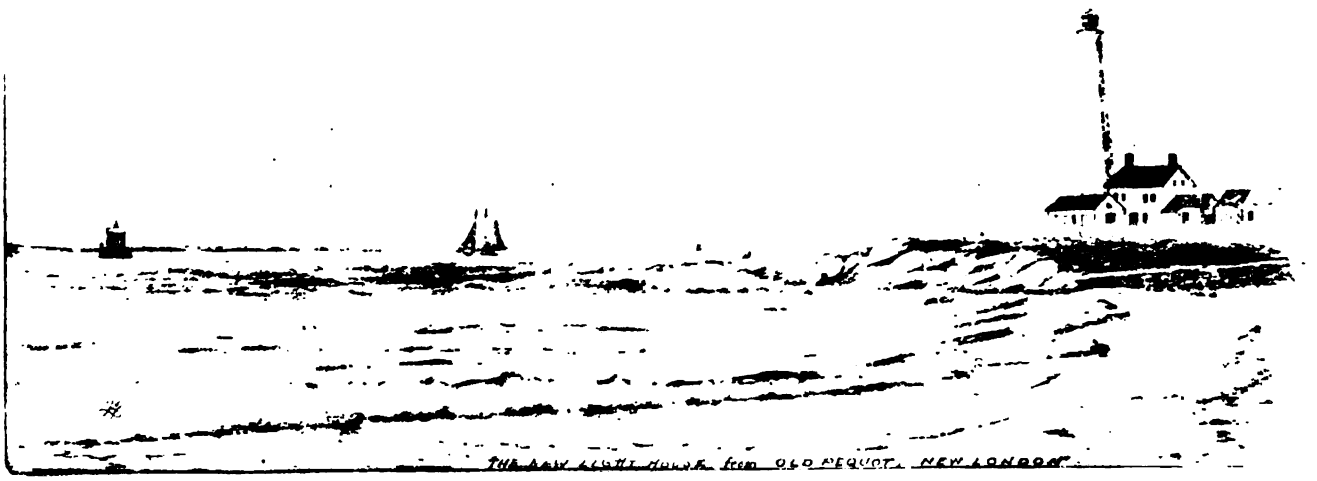
The large stations with first order lights and kerosene engines use large quantities of mineral oil. This oil is in 5-gallon cans encased in wood, and the work becomes hazardous when the tender is called upon to supply a station on a rock-bound, ice-choked coast. The tender approaches as near shore as safety will permit, the heavy whaleboats are loaded with the case oil, and in tow of the tender's launch is dragged through the ice floes, sometimes several hours making a landing and often a mile away from where they attempted to land. The boatload of oil is quickly discharged among the ice hummocks on the beach and later picked out and carried to the light station by the keepers. At other times when no ice prevails and heavy seas are running the work of landing on the beach is again full of risk. Quick work and expert handling is the order, and when within several hundred feet of the beach, the launch lets go of the whaleboat's tow-line and makes off to stand by. A kedge anchor with a heavy line attached is dropped from the stern of the whaleboat, a turn or two of the line is taken and slackened off as the beach is approached. This keeps the boat from swinging broadside and swamping or capsizing in the surf. As soon as the boat touches the beach the kedge line is made fast, and a bow-line quickly run out and secured ashore.

The crew hastily tumble out the oil cases and other supplies on the beach above high-water mark, let go lines from the beach, haul in on the kedge and get in tow of the launch again.

As soon as they come alongside of the tender they load again for some other light further along the coast, and attempt another landing under perhaps different and more exciting conditions.

The greatest risk is often experienced in making these beach landings, as the nature of the surf from offshore is deceiving, and its heaving running seas are not discovered until the boat is fairly among them, and it has frequently happened that the kedge anchor refused to take hold or the line parted, the boat has turned end over end, throwing the crew and supplies into the surf.

Other duties of the tenders include the transporting of keepers and their household effects when transferred from one station to another, the rebuilding by the crew of damaged lighthouses, and conveying the Light-house Inspector on his regular tours of station inspection.



THE NEW LIGHT HOUSE from OLD MEGUOT, NEW LONDON

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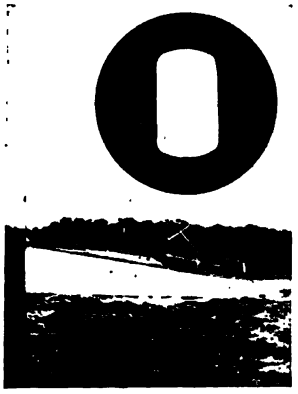
THE BUILDING OF ANWYL

W. Crosbie Gill and Harry C. Gill



OVERHEARD Mrs. G. talking to a neighbor, over the garden fence: "I don't know what is the matter with my old man, lately he cannot sleep at all; he seems to have some weighty matter on his mind." I had about eight tons of boat, but she did not know it; 'twas a close guess.

Son Harry and myself had long been discontented with our small boats, and we finally got together and decided to build a vessel that would house the entire family, should we be dispossessed at any time.

After digging back through RUDDER designs for several years, we agreed to build the 38-foot skipjack Naiad, and forthwith got out the moulds for same; by the time this was done, another copy of THE RUDDER fell due, and as it contained the plans of a cruiser by E. B. Schock we fell for it, and gave up the skipjack idea, not without some misgivings, for power boats were a new departure for us.

Time and money both being factors that cannot be lost sight of when there is a large bunch of beautiful girls to provide for, we calculated on saving much in getting the frame "knockdown"; many firms to whom we wrote were too dignified to build from any designs but their own; something must have shaken them up since then, for I notice now that the yachting magazines are full of ads of firms who are willing to build from any old plans, and do it well; wise people, there is no come back. The Valley Boat and Engine Company, late of Baldwinsville, N. Y., and now at Saginaw, Mich., had more sense, and sending in a very fair estimate, we rapidly closed with them, and are not sorry. After waiting so long for the frames that we thought the firm had skipped with the boodle, and we had taken down and started to clean the family blunderbus, a notice came from the railroad, saying the frame had arrived; could not go to work that day, honestly, too much for us; we did a Marathon over to the freight yard, and were greeted by the railroad agent with:

"Going to build a tugboat, Gillie? No! Then it's a 45-footer, ain't it?" Modestly replying, "No, sir; it's only a 34-foot cruiser." "Well, then it's the chunkiest keel I ever saw on a boat that size." Later we were very glad that it was so solid and strong.

We had no building suitable or convenient to start our navy yard, as the neighbors called it, but having a good-sized garden, the idea of a tent was the most practical, so we looked around for material for same, and down at Wallack's Theatre (where we pass most of our time employed in separating guileless theatrical managers from their cash in exchange for scenery,—no easy job at that,—and knowing of no more difficult thing to get away with, it gave us the necessary confidence to tackle the boat-building proposition) we dug up some old stage cloths of 12-oz. duck. If those stage cloths could only talk and tell you about the fair maids that have tripped across them. There are others that have tripped with the fair maids—but this is a boat story, and besides, the writer's wife is a RUDDER reader, so will not go into details just now. One stage cloth was used by the famous airy, fairy Lillian. (Don't make that into hairy, furry Billiken.) These cloths, with some old scenery, made a very comfortable tent 45 feet by 16 feet; by an error, we did not make it high enough in center to get on cabin, so later had to lift the lid some 5 feet.

Was it cold in that tent during the Winter? Say—you should have been there when big feet in cramped quarters kicked the lamp over into a pile of shavings. We spent the warmest and liveliest ten minutes that ever fell our way; three times the same thing happened, and we were getting to look forward to it, but the last kick put the lamp out of commission.

'Twas a good old-fashioned Winter, and we worked right along without discomfort, save on one day when it was 10° below zero, we broke three bits in less than three minutes, so quit that day.

It's an awful nuisance to have to work for a living, when you would rather stay home and build your own canoe, and I will confess to many days being taken off, when I should have been busy pushing a brush. It's H— to cheat the boss, when you are your own boss! Ah, well! to-morrow is another day.

We got the frame set up, and it faired up very well. The 630-lb iron keel not having arrived from the founders, we went ahead without it; a great mistake, as it meant later on digging a hole 12 feet long, 5 feet deep and 3 feet wide under the keel, and heaps of trouble. When brother yotters, like real brothers, who have always more uncalled-for criticism at their tongues' end than praise, wanted to know what the subway was for, we told them it was to get sewer connections for the toilet room.

The iron keel must have warped in cooling. Did'st ever try to straighten an iron bar 10 feet long by 6 by 4 inches, with an axe and an old flat-iron? Well, try it, if you want to learn something. Oh! the racket; Oh! the pounding and double "oo" the pertinent and hearty remarks addressed to iron founders in general. The tent, being sandwiched in between two wooden houses, every tap echoed over and over again; poor Mrs. ....., living next to us, says: "I'm glad that the boat is nearly finished, for no one but myself will ever know what I've suffered while you were building it." Regret the noise and all that but—

After the frame was up, we got out the planks (which

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were 3⅛ inches wide, straight for about 17 feet then tapering to 1⅛ inches at stern) out of 1⅛-inch cedar, which, smelling so much like unto cider, will account for our awful thirst; we found by this method that the boat was comparatively easy to plank,—and right here I want to say a good word for the Morss (Boston) planking clamp; no screws, self-clamping, easy and handy to use, the way it brings the seams home tight is a treat; there are others somewhat similar, but not as good. No! sir.

Our troubles were slight compared to some I have read about, and especially so in the case of the man in Philadelphia, who built a boat that turned into an airship, and flew over the house tops on launching day. Nothing was encountered in the construction of Anwyl that called for any great amount of thinking or exertion, except the raising of the funds, AND, the bending of the cabin coaming, that being gotten out of white oak 2 inches by 8 inches, and 17 feet long, bent to sheer and curved inwardly to cabin carlins; this was the only time a steam box would have been required, and not having made one, we went ahead without it, and bent it cold. We steamed enough ourselves to have softened any heart of oak, and had to rig up all kinds of devices to accomplish it, but we got there and slowly pulled it into place, and bolted it through with ⅜-inch bolts. A tiresome job, but the watchword was "Stick," and then also the remark, "It has only to be done once."

The selection of an engine; those that we fancied had a fancy price and those we could afford to buy we liked not; so took endless journeys to look for a second-hand engine through the wilds of New Jersey, and ran down "Big Bargains"—a truly disappointing and disillusioning task, but *never again*. By accident we dropped across one, a four-stroke, two-cylinder, 5½-inch bore 8-inch stroke, turning a propeller 26 by 30-inch pitch; weighing about half a ton. One grouchy agent, because we did not care for his machines, told us later that our engine would not push Anwyl more than two miles an hour, provided that we rowed at same time! Consoling news, wonder if he is right, and other such thoughts flashed through our minds, as my son and partner, and I looked at each other, dismayed. Why will not disgruntled salesmen take defeat gracefully, and show some sporting blood? Most of the representatives of marine engines that worried us were of the same calibre, extremely shoppy, not a sailor in the bunch, and only concerned in landing a sucker, and all desirous of selling more power than architect called for. One seller had the gall to tell us that naval architects were not to be relied on, that they only guessed at the power required. Can you beat that? (Inference, the higher the power, the higher the price.)

I was extremely sorry to hear that my very good friend, T. F. Day, had been seriously ill, as he had promised Anwyl a RUDDER flag (that never came),

Anwyl, Built and Owned by W. Crosbie Gill and Harry C. Gill, of New York City

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which gave us much pleasure; but just before launching time we were very pleased to hear of his recovery, and out of the gladness of his convalescence he made Anwyl a present of a very handsome set of twelve Stanley & Patterson dry batteries (a kind of the better the Day the better the deed!). The wireless kind that screws in, mounted in an extremely handsome case with polished brass trimmings, looked too good to put into a boat, and had great trouble in keeping the girls from taking it for a ditty box; and as practical as handsome; no danger from loss of current on humid days in a sweaty cabin. We have found the spark fat and certain, and like the widow's cruse of oil, they seem to last forever. We really believe we will not have to renew the batteries this season; they are simply great.

The aforesaid T. F. Day, editor of a magazine called THE RUDDER, wrote that he was coming to look us over, both the boat and the builders; but that catastrophe was averted by a fire at the race track, which engaged his close attention; said Day, it is well known, always studies his chart and courses before entering any long-distance race, so we pondered, and wondered, having that illness in mind, whether he was getting posted for a journey on a Red (hot) Sea, where the soup is always hot and looking up some spots not so warm, where he could regain his wind when stern chased by parties with sizzling belaying-pins in ever-ready paws. This by the way, is a boating story, and not a fire record. There was also a fire in THE RUDDER office.

Where did we get the name from? Well, we tried hard for weeks, but could not get anything to suit the craft, and that means something, with a large family, mostly girls, big girls, and all talking at once; simmered down finally to Anwyl, my name partly, and my wife's name, making a Welsh word, meaning darling, or dear one, and that fits both the boat and my dear old Dutch.

Anxious to be ready before Decoration Day, we did not wait to make the spars. Phyllis christened the boat, just before the boat left the tent, and got more of the wine on her new dress than she did on the boat. Says she, "It does seem a waste of good liquor to wet a boat's nose with wine, when it will be ever so much wetter in a minute, and besides, it might stain the paint."

* * *

Her accommodations are very generous for a boat of her length. Plans were given in THE RUDDER for June, 1908, page 509, Edson B. Schock, designer, who says that "she is an improvement on Irene II." We think for a cruiser that she cannot be beaten. We did not depart from the designer's plans, save in the matter of the cabin windows, where we used port lights in preference to square windows, as they are easier to keep tight, and also believing that Mr. E. B. Schock knows pretty well what he is about, and also that he is one of the finest ever.

It took from Thursday to Saturday to get down to the water's edge, and it was 7 p. m. before the boat was ready to move after cradle and skids were adjusted. The party that undertook to move Anwyl down to the creek, about a half mile away, made a gigantic fizzle of the job and only succeeded in dropping the boat, cradle and all, before she had gone 100 yards. If she had not been built as strong as we knew how, this would have been a story of a boat that was wrecked before launching; but heavy timbers and big bolts have more value than we reckoned on, and so our first cruise ended in front of a grocery store, much to the delight of the small boy. (Where on earth did all of those kids come from?) They were in and out of the wreck, and the writer was more concerned that they would knock over some of the shores and get killed than he was for the safety of the ship. The whole town was out and so was a green cop, who wanted to arrest the whole bunch of us for interfering with the traffic, which at that time of night amounts to one farm truck an hour.

"Youse'll have to get that boat out of that," says he.

Says the boat mover, "Will ye show me how and I'll be thanking ye."

"Well," says the cop, "youse'll have to put lanterns on it, annyow, and get a watchman, and then get it to h— or wherever yer goin', in the mornin'."

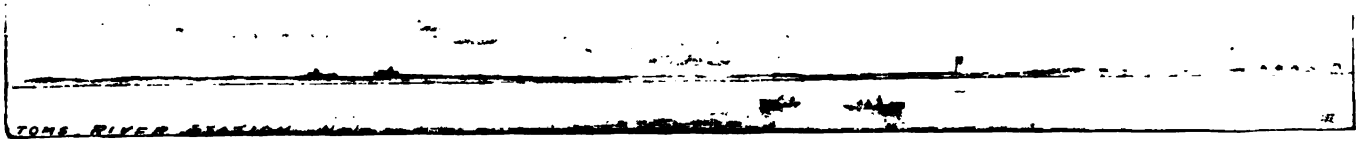
"Would yer like to have fog-horns and distress signals," says the boat mover, "and a lifeboat crew, and, and"—but the majesty of the law, having exhibited its power, brass buttons, and a brand new uniform, departed in the darkness of the night, amid cheers from the assembled villagers, peasants, etc.

We spent the night on board, being privileged characters to sleep in the middle of the road.

Next afternoon a new gang tackled the boat, and by night time had her safely down on the banks of the creek, and at 3 a. m. on a calm and peaceful Sunday morning, with the moon nearly at full and the comet wagging its tail pleasantly, with the faint glimmer of dawn paling the eastern sky, and without a ripple on the water, Anwyl slid easily and gracefully into the big drink, sat upright and plumb, like a great white gull. 'Twas over; and something to be pleasantly remembered by us was the glow of satisfaction that we two poor dubs felt, father and son, all by our lonelies, not another soul around to mar our pleasure, or to share our joy, as we shook hands, took a long pull on a damp bottle, and then proceeded to get the cradle from under, and tow her down to her moorings, smiled on by as rosy a sunrise as ever graced a morning sky,—a good omen for pleasant times to come. I believe there is a proverb that runs, "Happy is the launching that the sun shines on."

The end of most famous characters ends with a lively wake. Anwyl's end is not, as yet, in sight, or any wake perceptible, for she glides through the water like an eel.

What did she cost? I really could not tell you now; the coin just melted; that's all; or *whisper,* come around when my wife isn't listening.



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The Old and the New. Bloodhound Built in 1874, and Still Racing

Photos by A. E. Beken & Son, Cowes

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Shamrock IV Racing at Cowes, I. W.

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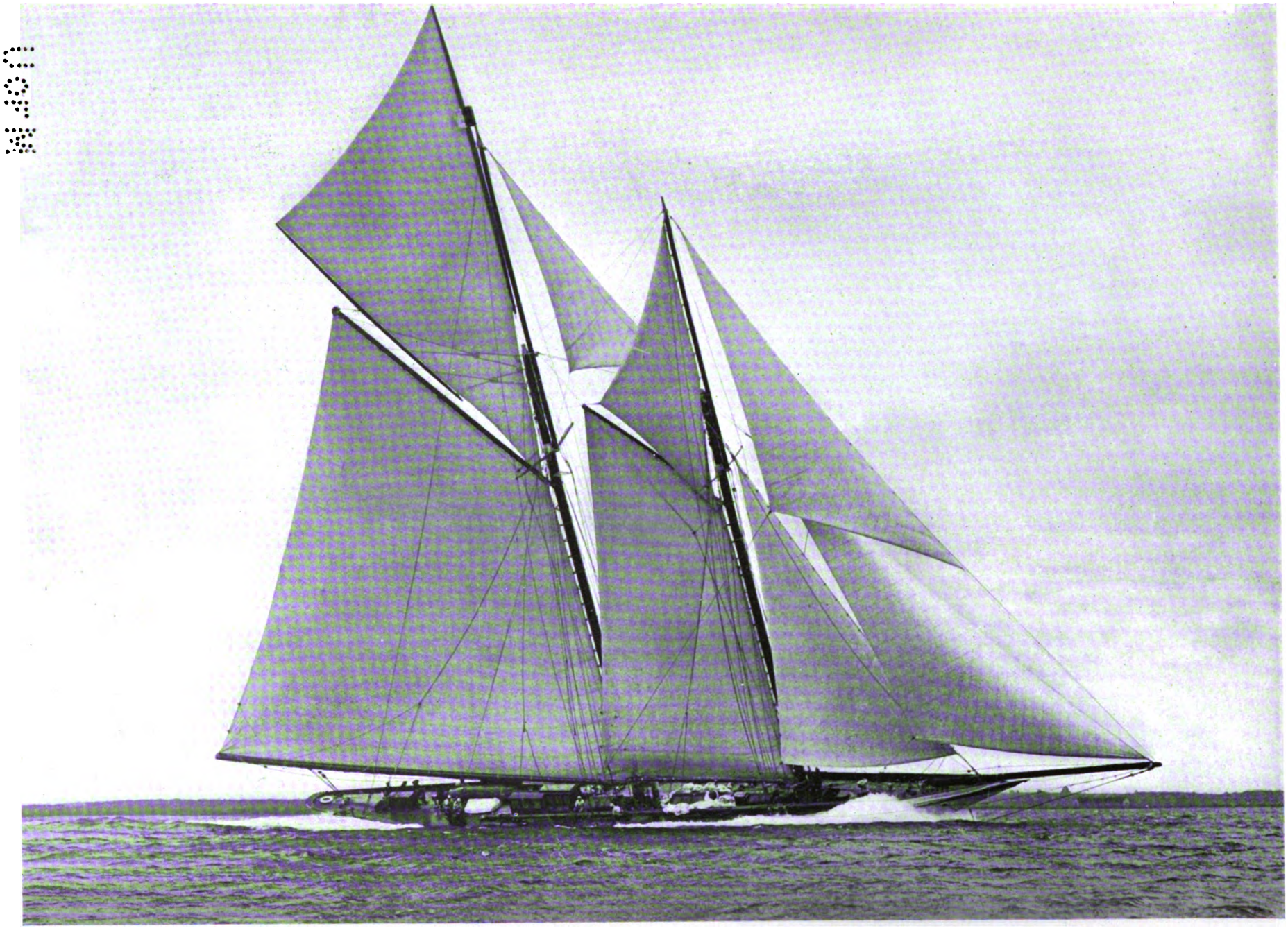

Photo by A. E. Beken & Son, Cowes

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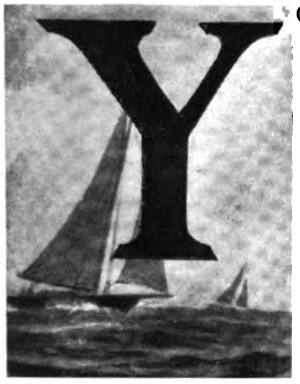
A HOLIDAY CRUISE IN JAPAN



OKOHAMA yachtsmen who can obtain leave of absence from their business on Easter Eve, are very glad to avail themselves of the clear four days, Good Friday to Easter Monday inclusive, affording an opportunity of a more extended cruise than the usual week-end run down the bay.

The Gulf of Yedo, or Tokyo Bay, on the western side of which Yokohama is situated, extends for nearly 30 miles N.E. and S.W., with a varying breadth of 12 to 15 miles. It is entered from the Pacific by the Uraga Channel, about 10 miles long by about five across. The greater part of the Bay, eastward and northward from Yokohama, is practically useless for yachting purposes, as the coast is low and the water shoals so gradually that it is impossible to get within two miles of the shore. The coast on the Southwest part is bold, rugged and picturesque, and our cruises are always in this direction.

For this Easter cruise, Nina, keel cutter, 40 feet on deck, and Asagao, keel knockabout, 32 feet on deck, had a rendezvous at the beautiful little harbor of Aburatsubo, a place which for peaceful charm would be hard to beat anywhere in the two hemispheres.

The weather conditions on Thursday night did not promise well, and at daybreak on Good Friday it was blowing pretty hard from the North. The owner of Nina, with a brother yachtsman and two Japanese hands, left moorings in Yokohama at 9:30 a m., and after beating out of the harbor laid a course down the bay, on port tack with the wind almost dead aft. Asagao had started some time earlier, and was already hull down, as the sea was a bit rough. With wind and tide we made a fast run down to the Futtsu forts, which lie across the neck of water between the bay and the Uraga Channel. Our Negus log showed that we were making 7.6 knots, and we passed Asagao before reaching the headland of Kannan Saki, whose light stands sentinel at the entrance to the bay.

In Uraga Channel the sea was much rougher, and Asagao had to heave to and reef. We jibed off Cape Sagami, whose light marks the southern end of the western side of Uraga Channel, and steering West on starboard tack, we were soon in smooth water under the lee of the southern extremity of the Sagami peninsula. Passing Matsuwa, a snug little anchorage, but difficult to get into, we were soon racing through the narrow and tortuous passage between Joka Shima and the fishing village of Misaki. This anchorage was full of native schooners, which had sought shelter from the blow, and at the pace we were going we had lively work to thread our way through them. Gaining the open, on the western side of the peninsula, we had to beat up past some very ugly outlying reefs. When sure that we could weather the farthest of these, we went about to make for the entrance to Aburatsubo, our outward journey nearly over. It was well that we did not cut it too fine, as we had only just passed a nasty bunch of submerged rocks over which the sea was boiling madly, when the bobstay turnbuckle parted, the screw stripping. Fortunately the forestay proved good and strong, the stout brass span-shackle held, and the bowsprit stood the strain. But in handling the jib, it got overboard, nearly taking a sendo with it, and they had a hard tussel before it was secured. With only the staysail to balance it, the mainsail made her steer very hard, and as the seas at that point were very short and steep, she required a lot of coaxing to keep her going. In smooth water Nina handles kindly with mainsail only, but it is another matter in a nasty jobble, and we were greatly relieved when we had gained past those hungry reefs, and were in the smooth water of the entrance to Aburatsubo.

Working into the inner pocket of this delightful little harbor, we were soon lying at anchor in peace and quiet, perfectly sheltered from the wind by the high, pine-clad hills surrounding this secluded haven. One of the charms of Aburatsubo is the entire absence of human habitations, and this is due to superstition, as the Japanese firmly believe that the place is haunted by the spirits of some warrior heroes of a bygone local tragedy. The ruins can still be seen of a castle here, the noble owner of which, to avoid capture by his enemies, decapitated himself with his own sword, and flung his own head down into the water. Accompanied by those of his faithful retainers, his spirit still haunts the place. Even the Japanese yacht hands would not venture alone

Members of the Mosquito Y. C., Yokohama Japan

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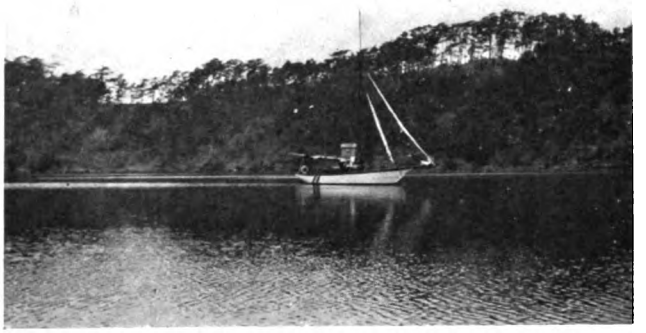

Nina at Aburatsubo

on deck at night, nor would they sleep on a yacht lying there if there were not foreigners on board. Needless to say, these "spooks" decline to reveal themselves to the irreverent eyes of foreigners.

By the time tiffin was ready, Asagao had also arrived, and her owner, with his son and daughter, joined us at table. We idled away Friday afternoon and the whole of Saturday in this peaceful locality, making excursions in our dinghies. Both Nina and Asagao have Berthon folding dinks, beautifully made by Yokohama boat-builders from the pattern of an imported one. Well finished, with double canvas, copper fastened throughout, and with brass fittings, a 10-foot Berthon costs about yen 60. They tow very light, stow handily, and will carry four men with ease.

An inspection of the Japanese Government Biological Institute at Misaki was highly interesting. There are many specimens of weird marine fauna, and the superintendents were most enthusiastic in exhibiting their treasures. In return we entertained a party of them on board, together with a number of students from the Tokyo University studying at the Institute. They examined the yachts with the keenest interest, especially the arrangements below decks.

On shore we inspected the tombs, centuries old, of some celebrated warriors, climbed hills, gathered spoil of ferns and plants for our gardens in Yokohama, and rejoiced in the knowledge that business was far away, no telegrams could reach us, or mails demand attention.

After breakfast on Easter Sunday we weighed anchor, and in the absence of wind proceeded under "power". Most of the yachts carry a long Japanese oar, as used to propel the native craft. Pivoted from a short outrigger on the quarter, this long scull is "wiggled" like a fish's tail, and sends their light boats along at a fair speed. But it is slow work with a heavy craft.

Outside there was hardly enough wind to give steerageway, and we made slow progress down to Misaki, where we anchored for tiffin. During the afternoon a fine Southerly breeze came up, and we raced past Matsuwa and Sagami Point, right across the Channel to a little fishing village on the opposite coast, where there is a tiny cove protected by projecting reefs. We ran in and anchored, held a levée attended by almost every youngster in the place old enough to crawl, which was succeeded by an audience of some of the village elders, to whom the sight of a foreigner is a rare occurrence indeed. Going ashore here we explored a fine quarry, right up in the heart of a hill, whence the stones are sent down in a chute to the level several hundred feet below.

Leaving this old-world spot later on in the afternoon, we had a grand reach across Channel to Uraga, the wind having got around to W.S.W. a fine wholesail breeze. The sea being smooth, we passed inside the dangerous Plymouth Rocks, and reached Uraga harbor long before sundown.

Here there are two dry docks, several slipways, and being a port of call for numerous small coasting steamers, schooners and native craft, it is usually the scene of much bustling activity. The bottom being soft mud, it is bad holding ground and anchors are apt to drag when there is a strong wind down the narrow valley.

We lay there that night and started after breakfast next morning on our last stage of 15 miles up the bay to Yokohama. The wind was very light from the North and we made slow progress against the ebb tide, which runs very strongly through the entrance to the bay between Kannan Saki and the forts. Beating slowly up past Yokosuka, the big Japanese naval station, and Tomioka, where the Mosquito Y. C. meet on Sundays, we were becalmed in Negishi Bay, under the hills on which is the race course. We dropped the kedge to await the turn of the tide, and had tiffin meanwhile.

With flood tide there came a very little wind, and we finished the rest of our journey to Yokohama at a very slow pace. Asagao's skipper spent some time chasing after fishing boats, to secure choice specimens from their catch, and arrived somewhat late at moorings with a torpedo-shaped fish box trailing overside, filled with fine fresh fish.

After four days of such careless freedom, one returns reluctantly to everyday existence, but with energies renewed to meet the call of business. For the rest of the season one must be content with a short sail in the interval between office hours and dinner time, and the ordinary Saturday afternoon and Sunday cruise. The Easter holiday, at the beginning of the season, is the most enjoyable, as the freshness of Spring has not yet yielded to the heat of Summer, and the extra time allows a more extended cruise than is usually possible at any other time of the year.

Characteristic Scene on Negishi Bay

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"THAT EVERLASTING IGNITION QUESTION"

E. J. Williams

THE successful operation of the gas engine from its inception has depended upon its ignition, and the gradual growth and development from the first experiments up to the present high efficiency of the gas engine has gone no faster than the ignition developments. The engine became more efficient as the more efficient ignition devices were supplied, and not prior to that time. In looking back over the marine field it seems but a few years ago when Daimler's "hot-tube" engines were considered a great improvement over the so-called naphtha engine, that familiar successor of the steam launch.

In the early eighties several makes of engines with the electric spark ignition were made and introduced. Practically all of these were of the make-and-break type of ignition, and one style had the contacts in circuit during the complete cycle of operation with the exception of the point where the ignition occurred when the piston hit the movable electrodes, broke the circuit, and produced a spark inside the cylinder. Of course such a method was very wasteful of electric current; and the continual purchase of new batteries (or elements for wet batteries used in those days) invariably totaled a greater cost than that of fuel—notwithstanding the then imperfect state of vaporizers, and the consequent extravagant use of gasolene. This early type of electric ignition was superseded by mechanically-operated devices, arranged outside the cylinder, which managed to keep the circuits open the greater part of the cycle. This style of mechanism only closed the circuit between the igniter points inside the cylinder long enough to permit of the proper magnetic saturation of the primary coil; and a tripping device was employed to give an abrupt, quick movement at the time of the break or separation of the electrodes.

Later, primitive magnetos and dynamos of high speed (compared with the speed of the engine) of various designs utilized a primary coil in circuit to reduce the cost of operation due to battery renewals. Practically all of these early magnetos were belt driven, and they were not by any means reliable and could rarely be depended upon. If kept in proper condition and watched constantly some of them seemed to give passably good results, but there were many unexplainable variations and "cranky fits" that were altogether distracting and confusing to the owner, no matter how expert he was—and in those days there were very few power-boat owners who could be considered very proficient in the knowledge and practice of the internal-combustion engine.

Of course the development to even the primitive magnetos was spread over a number of years, and there were a great many types of "improved" devices being brought out from time to time. Moreover, although there were some magnetos of the low-tension variety and of the true high-tension type on the market a number of years ago, particularly in the marine field, they did not come into general use at all early. One of these types of low-speed low-tension magnetos (without the use of the coil) has been in service in the automobile and to a limited extent on the power boats for a number of years. This is the style brought out by the original Stuttgart inventor —Bosch—who very early applied himself to the ignition problems of internal-combustion engines for stationary apparatus, automobiles and power boats. Aside from the reliability of this eminently successful low-tension magneto, with particular reference to power-boat use, the economy of these instruments recommends them. Though their first cost to the uninitiated always seems high, it is always true that in the end after several seasons of use one will find that his battery expenses would more than pay for the highest grade of low-tension magneto on the market. These low-tension magnetos in use for a number of years on power boats of America and abroad are practically the same type of device that until a few years ago predominated on the racing motor cars of the world. For some reason or other the racing auto drivers clung to make-and-break and low-tension magnetos after the high-tension magneto and jump-spark had been generally accepted by the automobile industry. This however is now a thing of the past.

With the advent of the automobile, jump-spark ignition with batteries in the early days was given consideration by the marine manufacturers and finally as every one knows, it gained a strong position in the industry. This system, now almost entirely superseded by magneto ignition in the automobile field, has the old disadvantages of battery consumption, considered both as an expense and as a trial and tribulation to the power-boat owner. Jump-spark as first operated in boats was used with wet batteries, which were constantly being spilled by the pitching of the boat; and when dry cells were introduced it was soon found that they must be protected so that moisture could not get at them. In the end (and it is possible that the end will not be very far off) the use of batteries, except as an auxiliary will go by the board as it has in the automobile.

In all of the experimenting to overcome the difficulties of the jump-spark for marine use, various types of generating instruments have been tried in connection with storage batteries and coils; some have used governors; automatic cut-outs, etc. In fact, every known means has been tried to furnish a constant voltage to the coil irrespective of the speed of the engine; but the only types of instruments which have proven successful are gear-driven magnetos, which require no coil for either jump-spark or make-and-break ignition. It is this type of magneto that predominates in the automobile, motorcycle and aeroplane fields. With the greater number of engines in all of these fields using the true high-tension design, and considering the rapidity with which the high-grade magneto has become standard in the automobile field, it is hardly prophecy to say that the high-grade magneto of both high and low-tension types will be uni-

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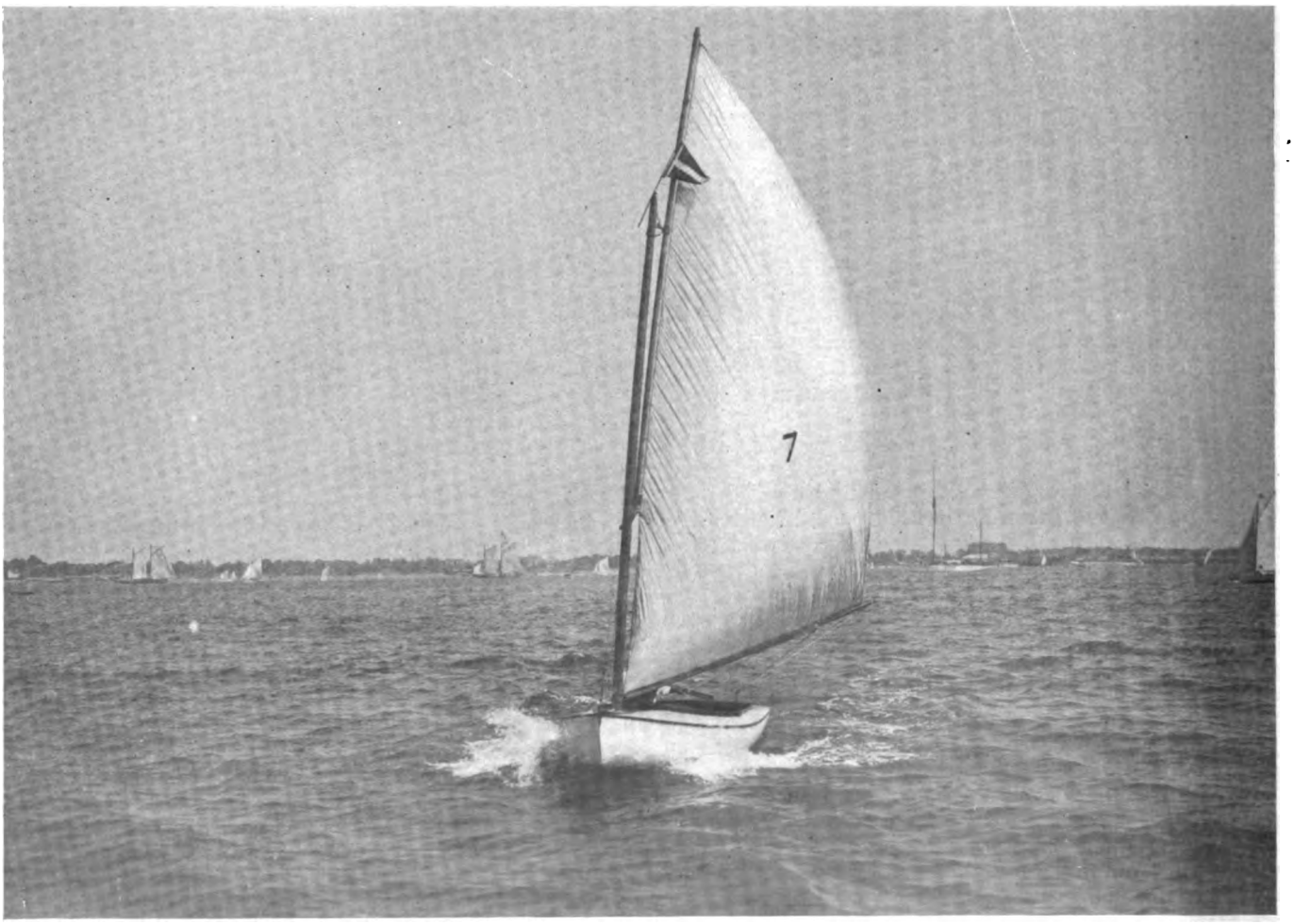
versally employed on marine engines a few years hence—at least on all high-grade engines of even moderate cost.

Even the inherent ignition disadvantages found in the multi-cylinder engines using mechanical make-and-break ignition have been overcome in the rather recently adopted magnetic plug ignition, which employs a low-tension magneto as a source of energy, and a magnetically operated make-and-break plug. With this system the wear of the movable parts inside the cylinder does not in the least affect the timing, because that is taken care of by the circuit-breaker on the end of the armature itself. No matter how much wear occurs on the movable parts of the plug, ignition in the cylinders goes on synchronously, because it is entirely controlled by the circuit-breaker which, instead of requiring adjustment every week or so (as with mechanically-operated make-and-break devices), often needs no adjustment for several seasons.

The movable parts of the magnetic plugs are enclosed in a pressure-tight shell which is screwed into the cylinder, entirely preventing that loss of compression which is a feature of the mechanical make-and-break system that furnishes one of the arguments often used against it and in favor of the jump-spark. These plugs, by the way, are of the type that can be called water-proof; for, when operating a stream of water can be played upon them without the least harm.

Of course, in all ignition discussions and considerations one must remember that for certain types of engines, intended for specific use, the make-and-break often seems better adapted than the jump-spark. Moreover, it is well to remember also that, aside from efficiency and reliability, the personal equation must be taken into consideration; and manufacturers of engines and power-boat owners often have individual preferences for or against make-and-break or jump-spark and these are frequently determined as largely by personal bias, individual point of view and personal experience as by more abstract and scientific reasons.

At any rate, the one who objects to make-and-break either on the ground of loss of compression, or because of the constant adjustment necessary for the mechanical make-and-break devices, must admit that in the magnetic plugs which screw into the cylinder walls in the same manner as the jump-plug there exists a pressure-tight condition, and that there is absolutely no disarrangement of timing due to wear. This seemingly ultimate solution of make-and-break ignition offers the advantages of easily insulated low-tension current supplied constantly from the magneto (without a coil) and the further virtues of a type of plug that has all the benefits of the jump-spark, plus the added advantage of not being affected by dampness.



One of the New York Canoe Club One-Design Boats

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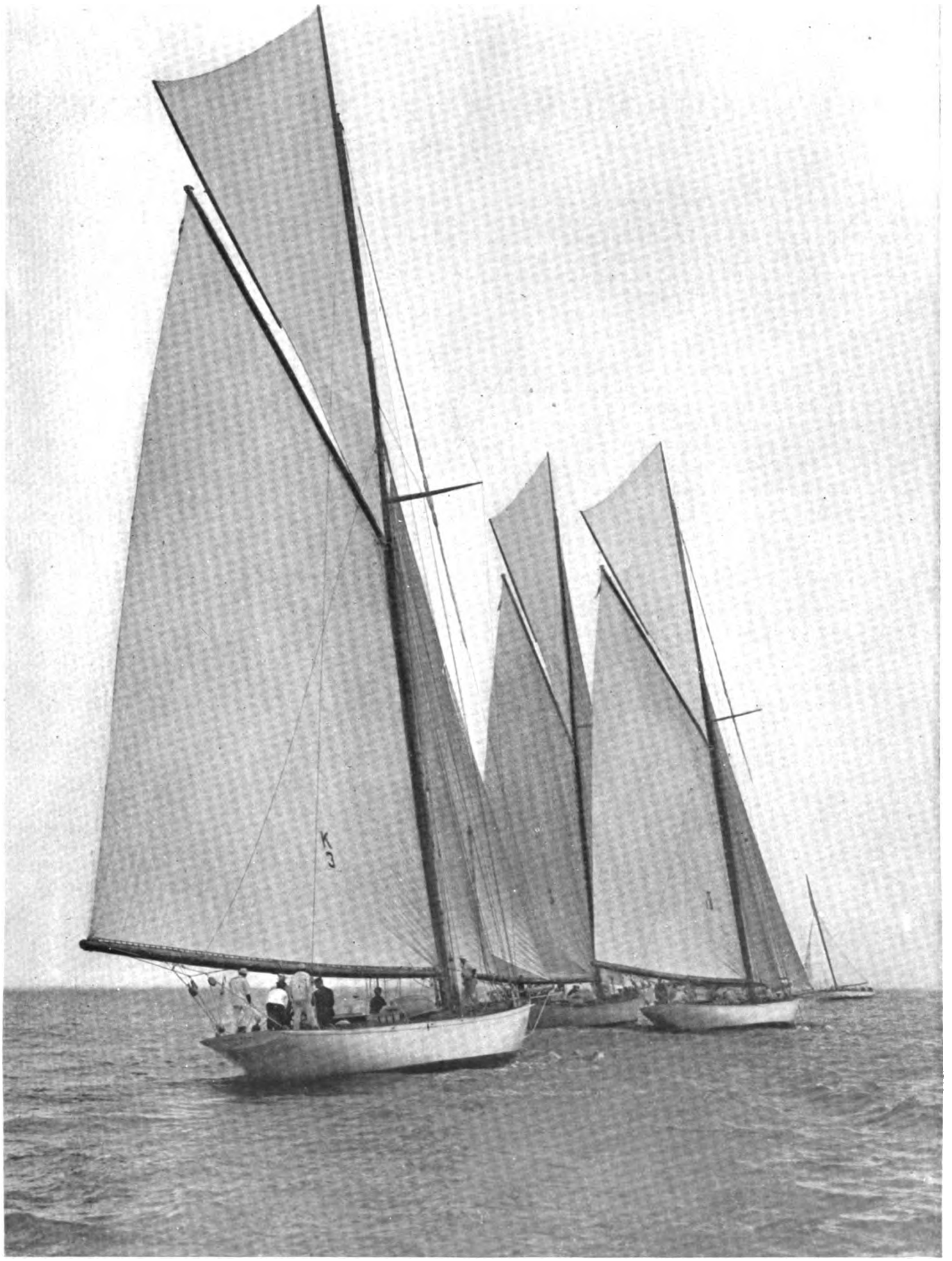

Start of the 65-Footers, Winsome, Istalena and Aurora, at Glen Cove, Long Island

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LLOYD'S SURVEY RULES FOR POWER BOATS

FOR the convenience of naval architects and shipbuilders, as well as owners and prospective owners of power craft, we publish herewith the rules recently compiled and adopted by Lloyd's Committee for the survey of vessels equipped with internal-combustion engines. The rules are well worth studying and it is interesting to note some of the features specially mentioned.

General

Section 1.—In vessels propelled by internal-combustion engines, the rules as regards machinery will be the same as those relating to steam engines, so far as regards the testing of material used in their construction and the fitting of sea connections, discharge pipes, shafting, stern tubes and propellers.

Construction

Section 2.—1. The following points should be observed in connection with the design of the engines:

2. The shaft bearings, connecting rod brasses, the valve gear, the inlet and exhaust valves must be easily accessible.

3. The reversing gear and clutch must be strongly constructed and easily accessible for examination and adjustment.

4. In engines of above 60 b.h.p. which are not reversible and which are maneuvered by clutch, a governor or other arrangement must be fitted to prevent racing of the engine when declutched.

5. Efficient positive means of lubrication (preferably sight feed) must be fitted to each part requiring continuous lubrication.

6. If the engines are of the closed-in type, they must be so fitted that the contained lubricating oil can be drained when necessary, and in wood vessels an easily drained metal or metal-lined tray must be fitted to prevent leakage of either fuel oil or of lubricating oil from saturating the wood work.

7. Carbureters, where petrol is used, and vaporizers, where paraffin is used, should be so designed that when the engine is stopped the fuel supply is automatically shut off. If an overflow is provided in the carbureter or vaporizer, a gauze-covered tray with means of draining it must be fitted to prevent the fuel from flowing into the bilges.

Strong metallic gauze diaphragms should be fitted either between the carbureter (or vaporizer) and cylinders or at the air inlets.

8. If the ignition is electric, either by magneto or by coil and accumulator, all electric leads must be well insulated and suitably protected from mechanical injury. The leads should be kept remote from petrol pipes, and should not be placed where they may be brought into contact with oil.

The commutator must be inclosed; and the sparking coils must not be placed where they can be exposed to explosive vapors.

9. No exposed spark gap should be fitted.

10. In paraffin and heavy oil engines where lamps are used for ignition or for vaporizing, these lamps should be fixed by some suitable bracket, and the flame inclosed when in use.

11. The circulating pump sea suction is to have a cock or valve on the vessel's skin placed on the turn of the bilge in an easily accessible position and the circulating pipe is to be provided with an efficient strainer inside the vessel. The discharge overboard is to be fitted with a cock or valve on the vessel's skin if it is situated under or near the load line of the vessel.

12. A bilge pump worked by the engines or an independent power-driven bilge pump is to be fitted, to draw from each part of the vessel. In open launches this bilge pump may be omitted provided suitable hand pumps are fitted.

13. The cylinders are to be tested by hydraulic pressure to twice the working pressure to which they will be subjected. The water-jackets of the cylinders to 50 lb per square inch and the exhaust pipes and silencer to 100 lb per square inch.

14. The exhaust pipes and silencer should be efficiently water-cooled or lagged to prevent damage by heat, and if the exhaust is led overboard near the waterline, means must be arranged to prevent water from being syphoned back to the engine.

15. The machinery must be tried under full working conditions, the report stating the approximate speed of vessel, the number of revolutions of the engines at full power, both ahead and astern, and the lowest number of revolutions of the engines which can be maintained for maneuvering purposes.

Rules for Determining Sizes of Shafts

Section 3.—The crank, intermediate, and other shafts if of the ordinary mild steel are to be of not less diameters than as given in the following table. When special steel is used, the sizes are to be submitted for consideration.

1. For petrol or paraffin engines for smooth water services:

$$\text{Diameter of crank shaft in inches} = C\sqrt[3]{D^2S}$$

where D=diameter of cylinder in inches.
S=stroke of piston in inches.

Four-Stroke Cycle	Two-Stroke Cycle	Bearing between each Crank	Two Cranks between the Bearings
For 1, 2, 3, or 4 Cyls.	1 or 2 Cyls.	C=.34	C=.38
" 6 "	3 "	C=.36	C=.40
" 8 "	4 "	C=.38	C=.425
" 12 "	6 "	C=.44	C=.49

For open sea service add .02 to C.

$$\left.\begin{array}{l}\text{Diameter of intermediate and}\\ \text{screw shafts in inches}\end{array}\right\} = C\sqrt[3]{D^2S\ (n+3)}$$

where D=diameter of cylinder in inches.
S=stroke of piston in inches.
n=number of cylinders.

For smooth water services:

C=.155 for intermediate shafts.
C=.170 for screw shafts fitted with continuous liners.
C=.180 for screw shafts fitted with separate liners or with no liners.

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For open sea services:

C=.165.

C=.180.

C=.190.

In engines of two-stroke cycle, n is to be taken as twice the number of cylinders.

2. When ordinary deep thrust collars are used the diameter of the shaft between the collars is to be at least 21/20 of that of the intermediate shaft.

3. In the cases of Diesel and other engines in which very high initial pressures are employed, particulars should be submitted for special consideration.

Fuel Tanks and Connections

Section 4.—1. Separate fuel tanks are to be tested with all fittings, to a head of at least 15 feet of water. If pressure feed tanks are employed, they are to be tested to twice the working pressure which will come on them but at least to a head of 15 feet of water. If the tanks are made of iron or steel they should be galvanized.

2. Strong and readily removable metallic gauze diaphragms should be fitted at all openings on petrol tanks.

3. Paraffin or heavy oil tanks, not used under pressure, are to be fitted with air pipes leading above deck. Pressure-feed tanks and tanks containing petrol, should be provided with escape valves discharging into pipes leading to the atmosphere above deck. The upper ends of all air pipes are to be turned down and pipes above one inch diameter are to be provided with gauze diaphragms at the end.

4. No glass gauges are to be fitted to fuel tanks containing either petrol, paraffin or heavy oil.

5. Filling pipes are to be carried through the deck, so that the gas displaced from the tanks has free escape to the atmosphere.

6. Separate fuel tanks should be provided with metal-lined trays to prevent any possible leakage from them flowing into the bilges, or saturating woodwork. Arrangements are to be provided for emptying the tanks and draining the trays beneath them. For petrol tanks the trays must have drains leading overboard where possible or they should be gauze-covered trays with means for draining them.

7. All fuel pipes are to be of annealed seamless copper with flexible bends. Their joints are to be conical, metal to metal. A cock or valve is to be fitted at each end of the pipe conveying the fuel from the tank to the carbureter or vaporizer. The fuel pipes should be led in positions where they are protected from mechanical injury and can be exposed to view throughout their whole length.

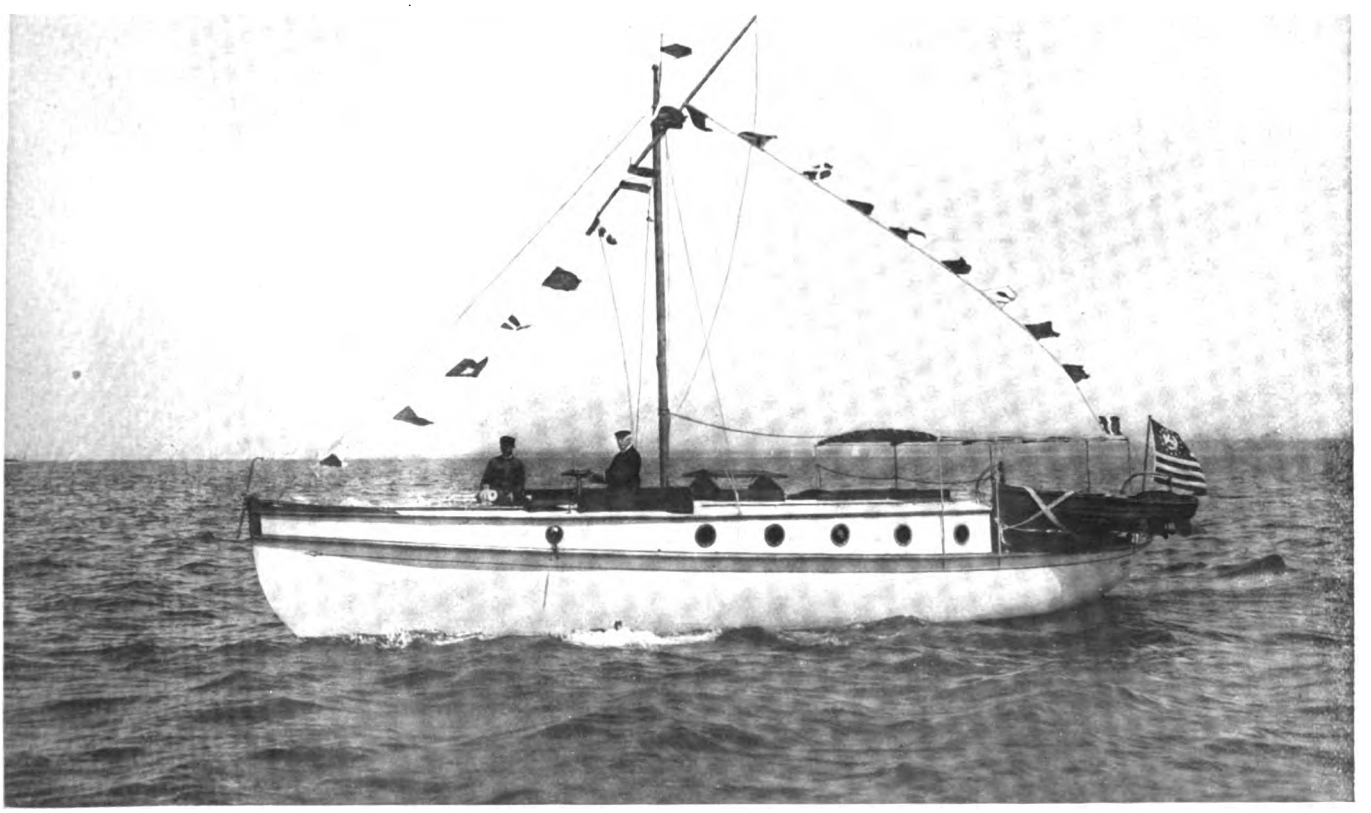
8. The engine room, and the compartment in which the fuel tanks are situated are to be efficiently ventilated.

9. An approved fire extinguishing apparatus must be supplied.

Periodical Surveys

Section 5.—1. The machinery is to be submitted to survey annually. At these surveys the cylinders, pistons, connecting-rods, crank and other shafts, inlet and exhaust valves and gear, clutches, reversing gear, propeller, sea connections and pumps are to be examined. The electric ignition is to be examined and the electric leads tested. The fuel tanks and all connections are to be examined, and if deemed necessary by the surveyor, to be tested to the same pressure as required when new. If practical, the engines should be tested under working conditions.

2. The screw shaft is to be drawn at intervals of not more than two years.



Florissa 18-25-H.P. Sterling Engine. Designed by W. P. Stephens and Built by Alex. Macdonald for H. W. Eaton of Larchmont, N. Y

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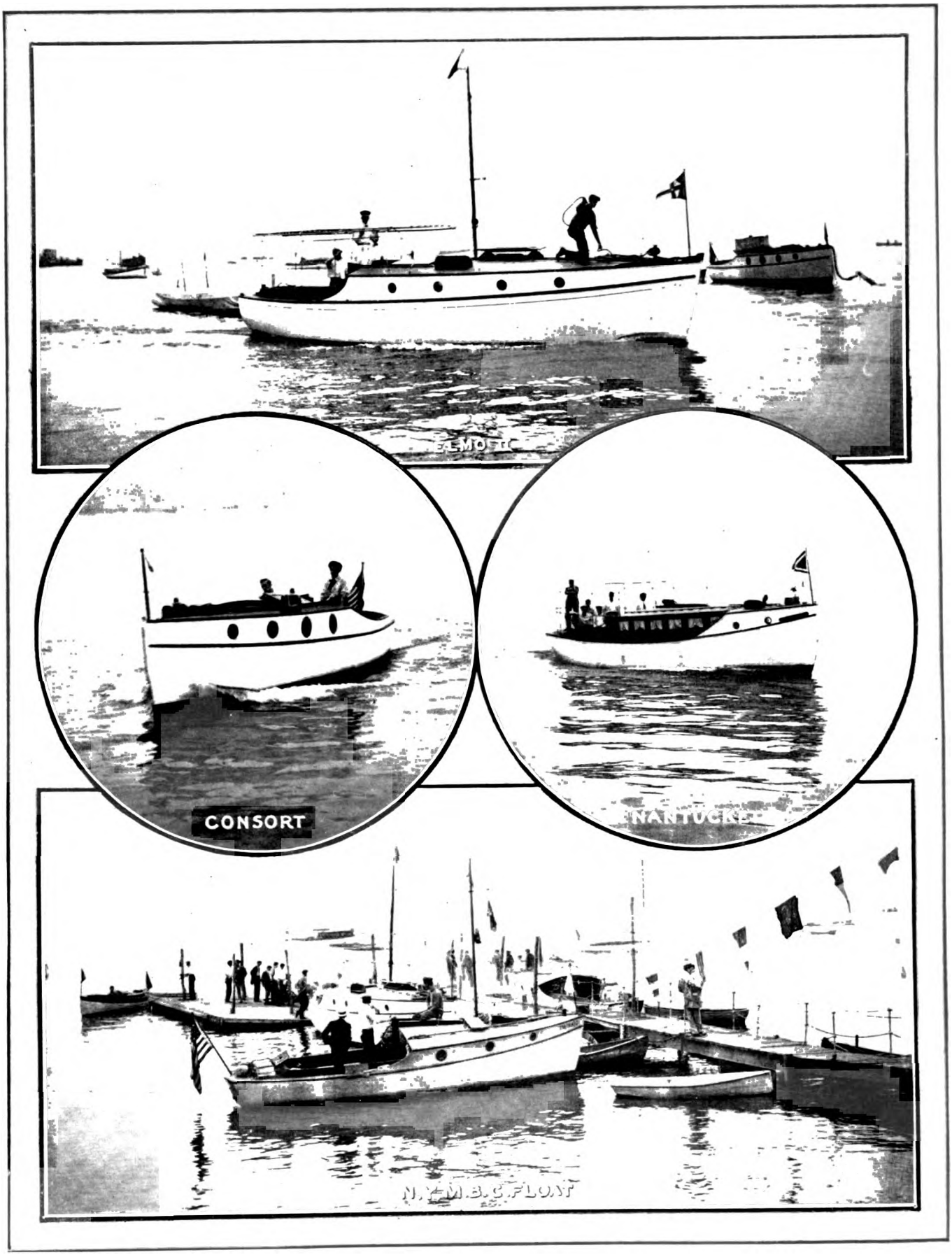

New York-Albany Race Winners—Elmo II First Nantucket Second and Consort Third

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SUMMARY

SECOND ANNUAL NEW YORK-ALBANY RACE, NEW YORK MOTOR BOAT CLUB

Start July 2d, 7 P. M. Distance 270 Statute Miles

Boat	Rating	Allowance	Turning Mark Albany, July 3d	Time of Finish New York, July 4th	Total Elapsed Time	Corrected Time Finish	Owner	Club
Elmo II	38.16	1:57:42	12:17:56 P. M.	3:17:35 A. M.	32:17:35	30:19:53	F. D. Giles, Jr.	Audubon Y. C.
Nantucket	41.40	Allows	12:08:40 P. M.	5:25:53 A. M.	34:25:53	34:25:53	John Meyer	Orum Y. C.
Consort	35:64	3:50:06	12:24:45 P. M.	10:06:20 A. M.	39:06:20	35:16:14	C. F. Chapman	N. Y. Motor Boat Club
Kid II	36.90	2:51:50	3:37:42 P. M.	10:17:01 A. M.	39:17:01	36:25:11	C. H. Dugliss, Jr.	N. Y. Motor Boat Club
Twin Kid	33.66	5:22:55	4:35:42 P. M.	3:45:51 P. M.	44:45:51	39:22:56	P. A. Vallance	N. Y. Motor Boat Club
Lillian	34.56	4:42:17	9:40:00 P. M.	4:11:25 P. M.	45:11:25	40:29:08	L. Walters	Hudson River Motor Boat Club
Monreve	37.62	2:21:58	4:06:45 P. M.	2:05:15 P. M.	43:05:15	40:43:17	E. E. Barney	N. Y. Motor Boat Club
Imp	32.58	6:20:34	8:26:00 P. M.	7:25:00 P. M.	48:25:00	42:04:26	Arthur Haas	N. Y. Motor Boat Club
Polar Star	35.82	3:40:44	Withdrew from race at Poughkeepsie				Ralph Croft	Audubon Y. C.
Arlington II	38.52	1:45:41	Withdrew from race at Poughkeepsie				Jos. Klipper	N. Y. Motor Boat Club
Levine	40.68	0:24:15	Withdrew from race at Albany				J. L. Costello	N. Y. Motor Boat Club
Alfred S	28.98	10:03:53	Withdrew from race at Milton				H. Soeldner	Orum Y. C.

Winner of race, also time prize, Elmo II; second Nantucket, third Consort.

NEW YORK-ALBANY RACE

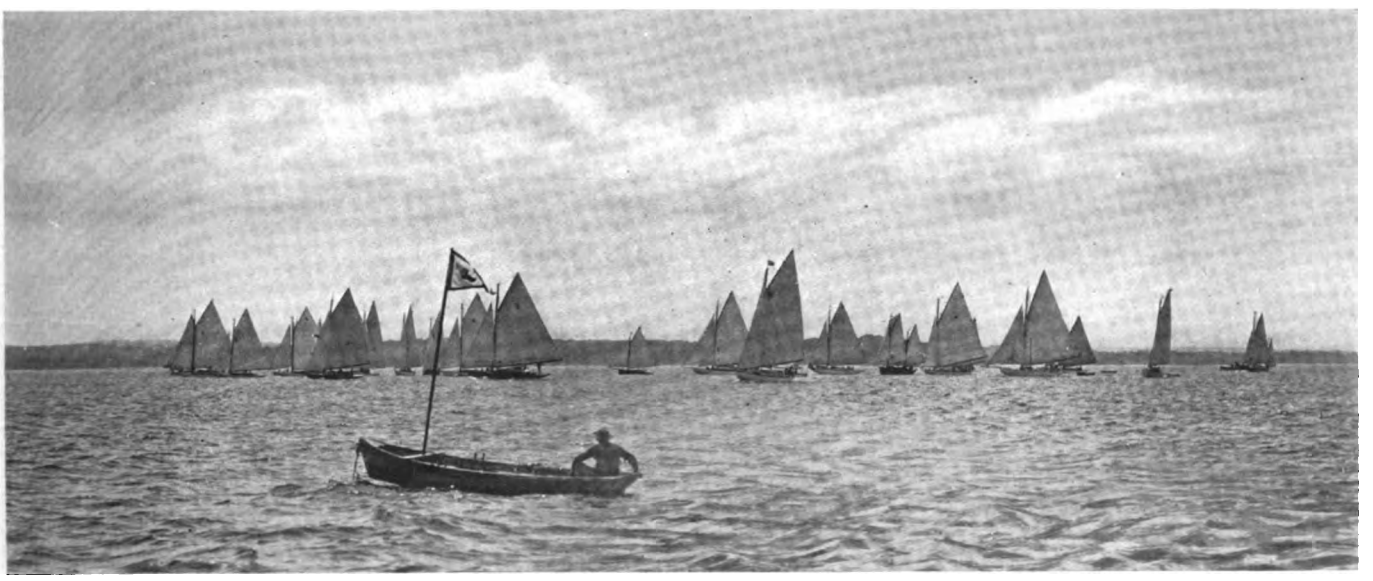
THE second annual long-distance race of the New York Motor Boat Club on the Hudson River between New York and Albany and return was this year partially spoiled by weather conditions, which caused most of the boats to run aground and prevented good time being made. The fleet was started on July 2d, at 7 p. m. and consisted of twelve boats, one of which was an open launch.

Arlington II was the first over the line, closely followed by Elmo II and Consort. The rest of the fleet followed in short order, with Polar Star bringing up in the rear. At Fort Washington Point, Elmo II took the lead, with Nantucket and Monreve close aboard. At Rockland Point, Elmo, Nantucket, and Monreve still led the fleet in that order, and as the night progressed the weather continually got hazier until at 2 a. m. Sunday a heavy fog shut down; according to weather reports one of the thickest seen on the Hudson in years, which more or less demoralized the fleet, and which caused the entire fleet with one exception to either anchor or run aground, the exception being the little Consort, which craft went through without hitting anything or resorting to the necessity of anchoring.

The committee which had gone up from New York to Albany to time the boats were on hand in good season the following day, but it was not until 12:08:40 p. m. that Nantucket rounded, followed by Elmo II at 12:17:56, and Consort at 12:24:45, making a difference of only 16 minutes between the first and third boats, a remarkable fact considering the conditions.

Nantucket and Elmo II continued down the river without stopping, but Consort took on gasolene and reported having seen no other boats except Monreve, high and dry on the rocks at Schermerhorn and Elmo also aground, but her crew got her going with the result that she reached Albany in second place. At 4:06 p. m. Monreve showed up and reported being aground for five hours, having been crowded ashore by one of the river steamers. On the way down the river Elmo II managed to pass Nantucket and finished at 3:17:45 Monday morning, winning not only first prize on corrected time, but also the fast time prize. At 5:25:53 Nantucket finished, and at 10:06:20 Consort arrived in time to win the third prize. The balance of the fleet straggled in later and at 7:25 p. m. Imp, the only open boat in the race, finished, having made the trip without accident.

It is very unfortunate that the success of the race was marred by the fog, as the race last year was one of the most successful events of the season and brought a large entry list.



Start of the Sailing Fleet in the Annual Block Island Race of the N. Y. A. C.

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SUMMARY

BLOCK ISLAND POWER-BOAT RACE

Start June 25th, at 5 P. M. Distance 100 Nautical Miles

Boat	Rating	Allowance	Owner	Club	Finish	Elapsed Time	Correct'd Time
Nutmeg	48.0	Scratch	W. A. Strong	Nassau	6:07:00	13:07:00	13:07:00
Margo	45.2	0:32:15	Russell Dart	Columbia	5:14:32	12:14:32	11:32:17
Charlotte	45.2	0:32:15	W. H. Way	Sea Cliff	6:23:10	13:23:10	12:50:55
Surprise	39.7	1:48:59	F. D. Cadmus	Staten Island	Did not finish		
Elmo II	38.8	2:03:25	F. D. Giles, Jr.	Audubon	5:30:50	12:30:50	10:27:25
Gracelda	37.4	2:27:38	J. N. Norris	Sea Cliff	6:15:32	13:15:32	11:03:48
Ymir	38.3	2:11:44	D. B. Brinsmade	——— ———	7:38:02	14:28:02	12:00:24
Elizabeth	34.1	3:32:22	L. D. Huntington	New Rochelle	7:15:00	14:15:00	10:42:38

Won by Elmo II, Elizabeth second.

BLOCK ISLAND ANNUAL RACE

THE seventh annual Block Island Race held under the auspices of the N. Y. Athletic Club this year had thirty-five starters in the sailboat division, twenty-eight of which finished the course. In the power-boat division all but one of the eight starters finished.

The sailing craft were started on Saturday, June 25th, 11:15 a. m., in a light Easterly breeze which later hauled to Southeast and Southwest, and alternately blew and petered out until a light Westerly finally blew the fleet into the Great Salt Pond, where, as usual, the crews partook of the annual shore dinner and the fortunate ones received the prizes. Wanderer IV won first prize, Interim second, and Crescent third. In the handicap division Grace II captured the trophy, Rowdy winning fast time prize.

In the power-boat division, racing for the Day Challenge Trophy, which class was sent off at 5 p. m., eight cruisers came to the line and got away in good order. The conditions for the power boats were perfect and they made an easy trip of the 100-mile run. One of the boats, Surprise, dropped out of the race and the balance of the fleet finished within two hours of each other. Elmo II proving the winner, with Elizabeth second, and Gracelda third.

SUMMARY

SEVENTH ANNUAL BLOCK ISLAND RACE, N. Y. A. C.

Start June 25th, 11:15 A. M. Distance 100 Nautical Miles

Boat	O.A. Length	Allowance H. M.	Owner	Club	Finish	Elapsed Time	Corrected Time
Notos	46.6		G. K. Benson	New Rochelle	8:02	20:47	20:47
Lady M	44	25	Moulton & Myrick	New Rochelle	8:46	21:31	21:06
Juanita	43.6	30	S. C. Hunter	New Rochelle	10:49	23:34	23:04
Oriole	43.6	30	C. A. Goodwin	Hartford	Did not finish		
Rowdy	43.6	30	H. S. Duell	American	7:55	20:40	20:10
Florence	42	45	R. A. Brown	N. Y. A. C.	8:43	21:28	20:43
Crescent	41.6	50	A. G. Hill	Staten Island	7:56	20:41	19:51
Fearless	41.6	50	B. R. Stoddard	New Rochelle	9:55	22:40	21:50
Scud	41.6	50	G. P. Granbery	New Rochelle	10:53	23:38	22:48
Saladin	41	55	R. W. Rathborne	N. Y. A. C.	11:45	24:30	23:35
Okee II	40.6	1:00	Mahlstedt Bros.	N. Y. A. C.	10:18	23:03	22:03
Victory	39	1:15	H. A. Jackson, Jr.	N. Y. A. C.	10:51	23:36	22:21
Waialua	39	1:15	H. L. Stone	New Rochelle	9:07	21:52	20:37
Tillicum II	39	1:15	C. S. King	N. Y. A. C.	10:52	23:37	22:22
Newasi	39	1:15	O. W. Jones	Huguenot	10:29	23:14	21:59
Essex	38	1:25	P. W. Griffin	Huguenot	9:31	22:16	20:51
Interim	38	1:25	R. N. Bavier	New Rochelle	8:27	21:12	19:47
Naiad	36	1:45	J. Burns	Harlem	Did not finish		
Onrest	35	1:55	W. R. Eimer	New Rochelle	Did not finish		
Quest	35	1:55	Vulte Bros.	N. Y. A. C.	Did not finish		
Chinock	34.6	2:00	Lambden & Morse	New Rochelle	9:51	22:36	20:36
Wanderer IV	34.6	2:00	R. B. Budd	Norwalk	8:18	21:03	19:03
Insurgent	33	2:15	W. L. Durant	N. Y. A. C.	11:12	23:57	21:42
Wabun	33	2:15	H. B. Post	South Side	11:34	24:19	22:04
Keewaybun III	33	2:15	F. D. Trapp	New Haven	11:08	23:53	21:38
Maryola	33	2:15	A. F. Bradley	New Rochelle	10:54	23:39	21:24
Bilot	31.6	2:30	R. B. Cook	Gravesend Bay	11:40	24:25	21:55
Grace II	31	2:35	J. F. Lambden	New Rochelle	10:54	23:39	21:04
Wahkan II	30	2:45	Robbins & Scribner	Bensonhurst	11:48	24:33	21:48
Surprise II	29.6	2:50	M. S. Kattenhorn	New Rochelle	12:10	24:55	22:05
Io	29	2:55	C. A. Marsland	New Rochelle	Finished but not timed		
Whileway	29	2:55	W. C. Cartwright	Stuyvesant	10:53	23:38	20:43
Hoyden	27.6	3:10	W. J. Coen	Williamsburg	Did not finish		
Guardia	27.6	3:10	D. Bacon	New Rochelle	1:02 P.M.	25:47	22:37
Cricket	24.6	3.40	H. P. Wells	Staten Island	Finished but not timed		
Nereid	28	3.05	E. H. Shethar	New York Y. C.	Did not finish		

Won by Wanderer IV, Interim second, Crescent third.

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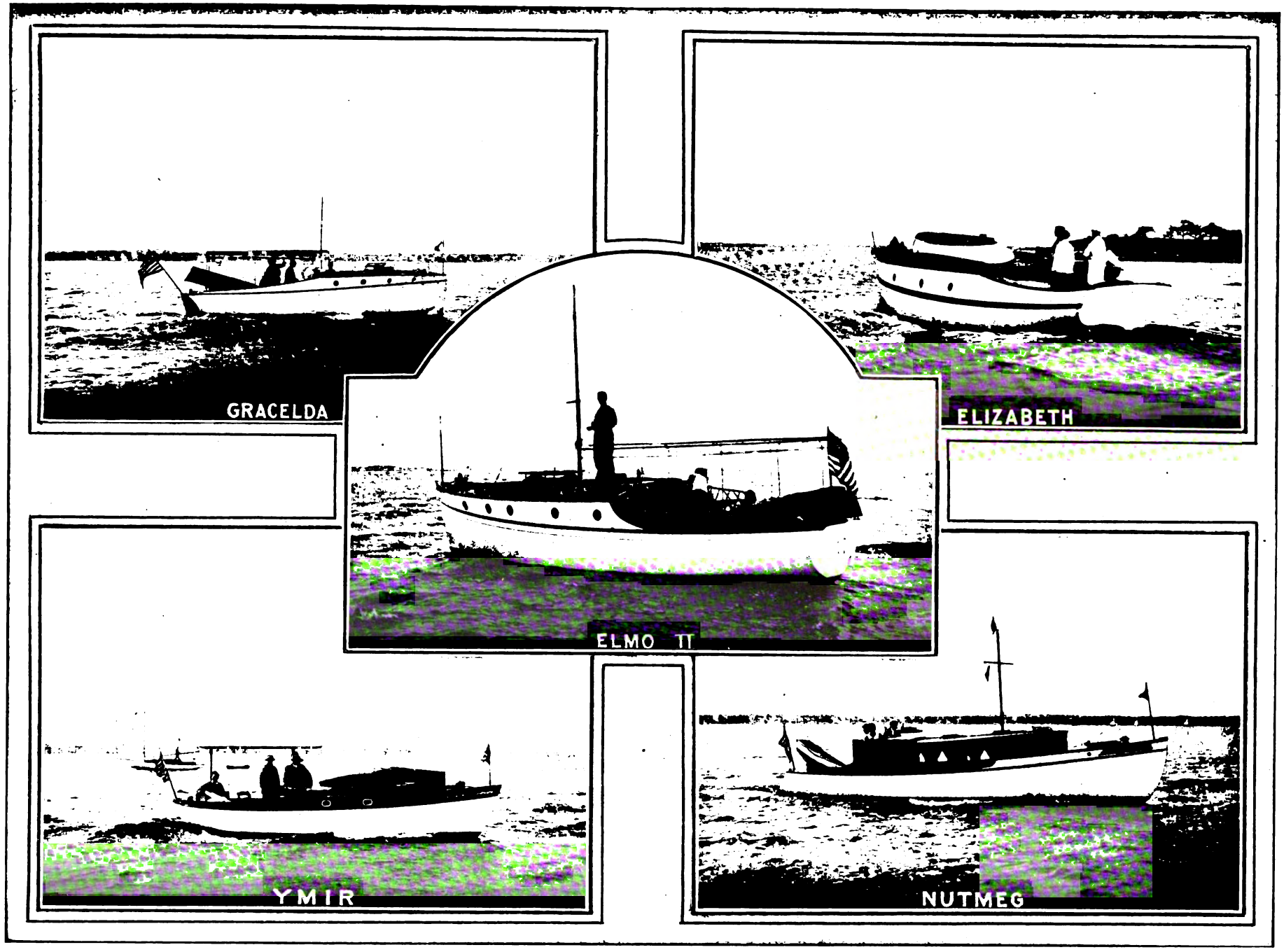

Contestants in the Block Island Race

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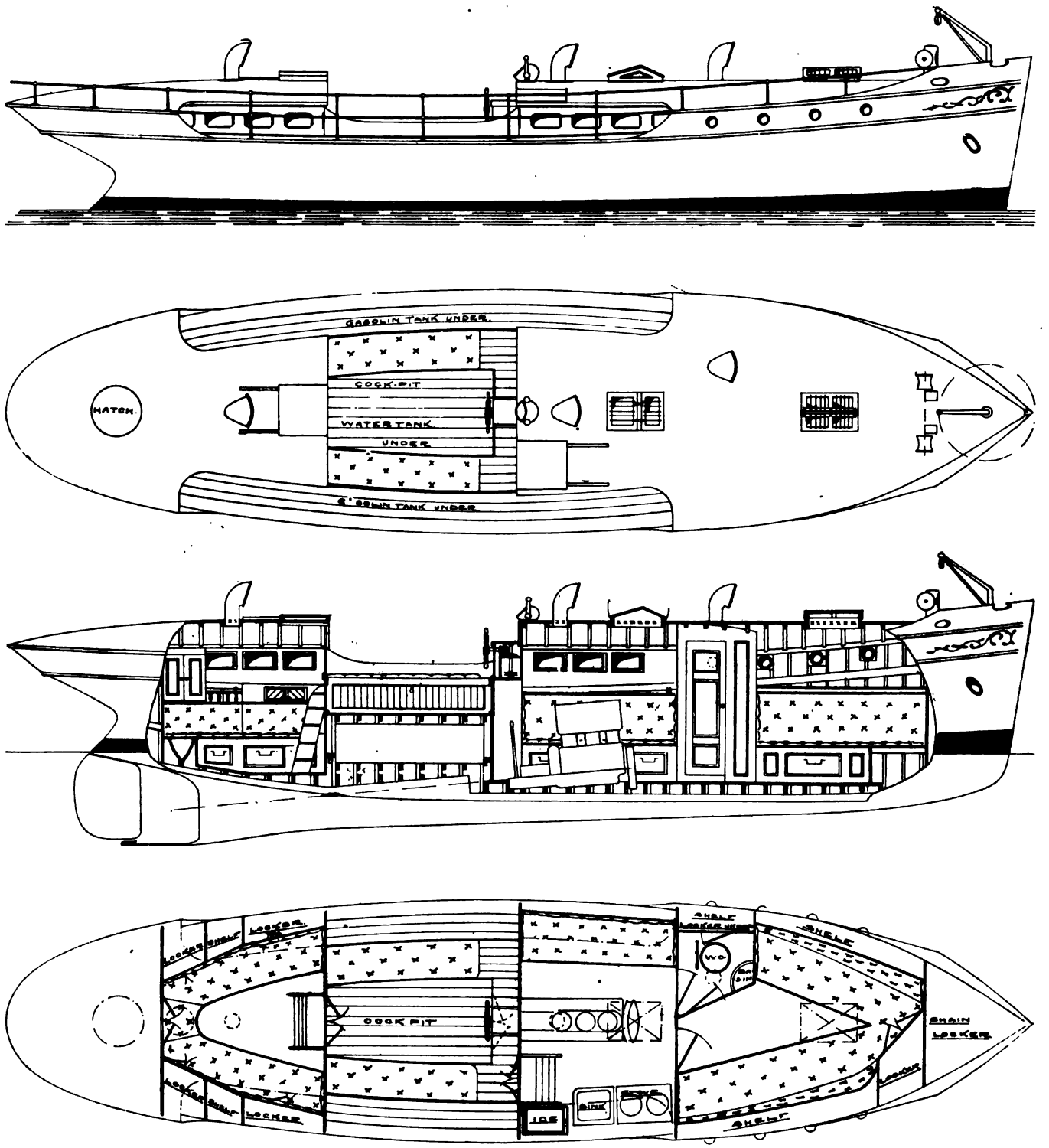

Forty-Footer. Designed by C. Theiste, Trondhjem, Norway

NORWEGIAN CRUISER

THE 40-footer shown in the accompanying drawings was designed by C. Theiste, of Trondhjem, Norway, as a seagoing cruiser, the intention being to produce a dry and seaworthy craft that might be used in comfort in any weather likely to be encountered in Summer cruising.

"The raised deck forward and aft will protect the cockpit from water, and when rolling the good freeboard and coaming will make the cockpit a dry place, which, of course, is to be made self-draining by scuppers. There is accommodation for five persons, and as one of the cabins is situated aft of the cockpit and separated from the forward cabins, ladies will have their own saloon. The water tank is located under the cockpit floor, and the gasolene tanks, one on each side of the water tank. The raised deck forward has a rail lining as a protection when you are handling the anchor or

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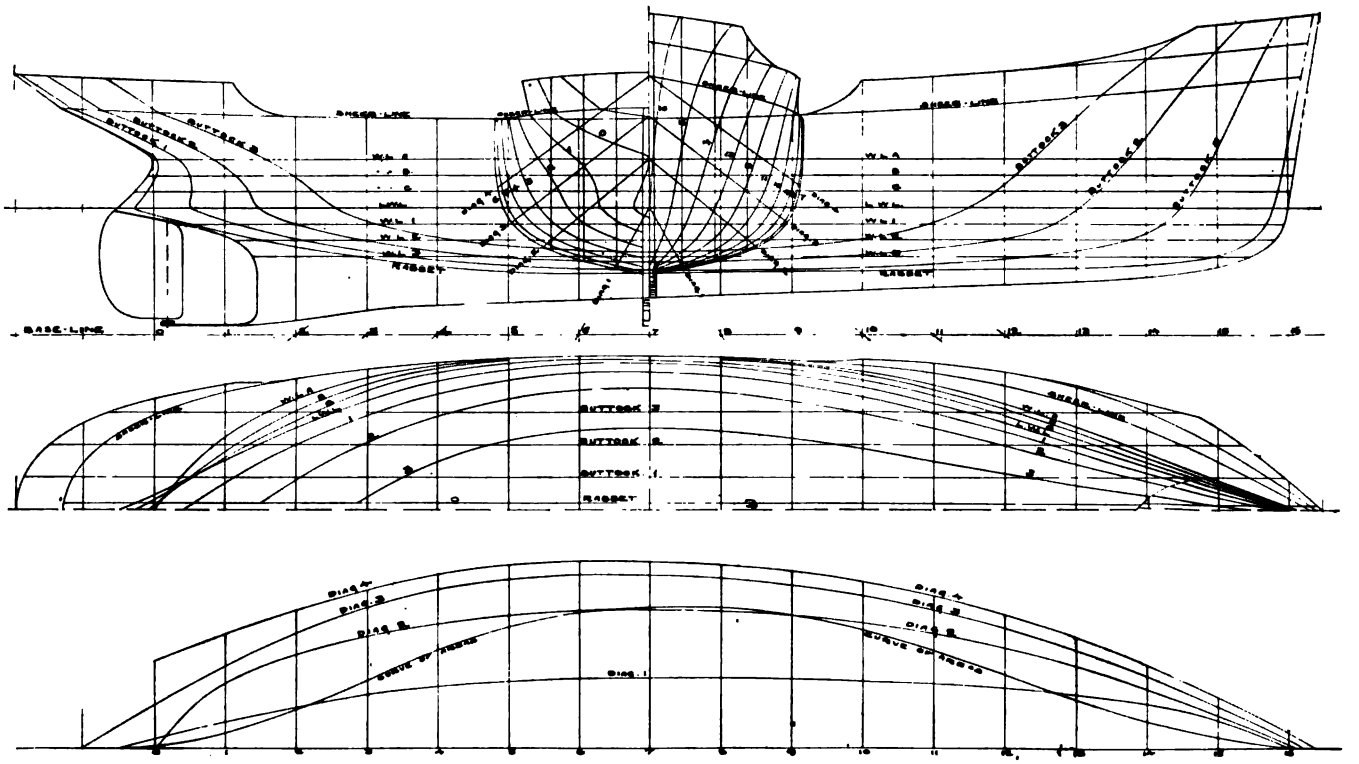


Lines of Forty-Foot Norwegian Cruiser

picking up moorings, and it will also be a good protection in a head-sea. With an 18-h.p. engine the boat will do about 9 knots."

The dimensions are:

Length o. a.	40	feet	0	inches
Length w. l.	35	"	10	"
Breadth, extreme	9	"	4½	"
Breadth, w. l.	8	"	11	"
Draught, extreme	3	"	6	"
Freeboard, bow	5	"	0	"
Freeboard, least	2	"	8½	"
Freeboard, stern	4	"	1	"

THIRTY-FOOT LAUNCH

THE 30-foot launch shown herewith was designed by Edson B. Schock for Messrs. S. S. Martin and E. M. Fulton, for use as a market boat on Chesapeake Bay. The idea being to secure an all-round boat that could be used for carrying trunks, etc., from camp to the railroad station, and for going to market when they did not wish to use their larger yachts.

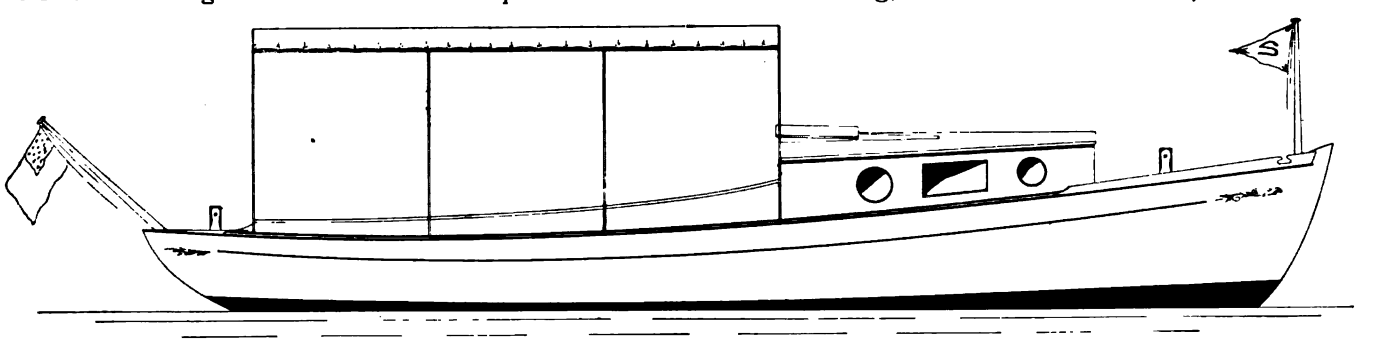
In addition to this use the design would make an excellent tender to a small racing yacht, by increasing the size of the engine to about 10 or 12 h.p. The cabin gives an excellent place for storing sails and tackle, while quite a party could watch a race from the cockpit, which is very roomy and self-bailing. The boat would also give good sleeping accommodations for two persons, as there are two full-length transoms.

The construction is of the very best, although simple, as it was desired to keep the cost down as low as possible. The keel frames, stem and dead-wood are of oak, with cedar planking copper fastened, and yellow pine clamps, shelf and stringers, while the house is cypress. The joinerwork is tongued-and-grooved cypress and the cockpit is ceiled, in place of the usual staving, which gave a little more room.

The engine is an 8-h.p. Uncle Sam and the gasolene tank, which is located under the after seat in the cockpit, has a capacity of 50 gallons.

The dimensions are:

Length o. a.	30	feet	0	inches
Length w. l.	25	"	10	"
Breadth, extreme	7	"	6	"
Breadth, w. l.	6	"	7	"
Draught, extreme	2	"	6	"
Overhang, forward	1	"	10	"
Overhang, aft	2	"	4	"



Thirty-Foot Launch Designed by E. B. Schock, New York City

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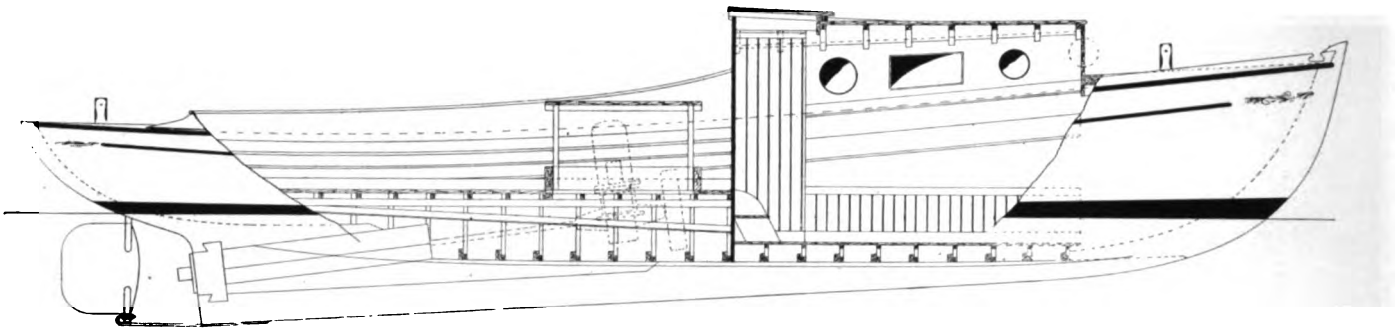

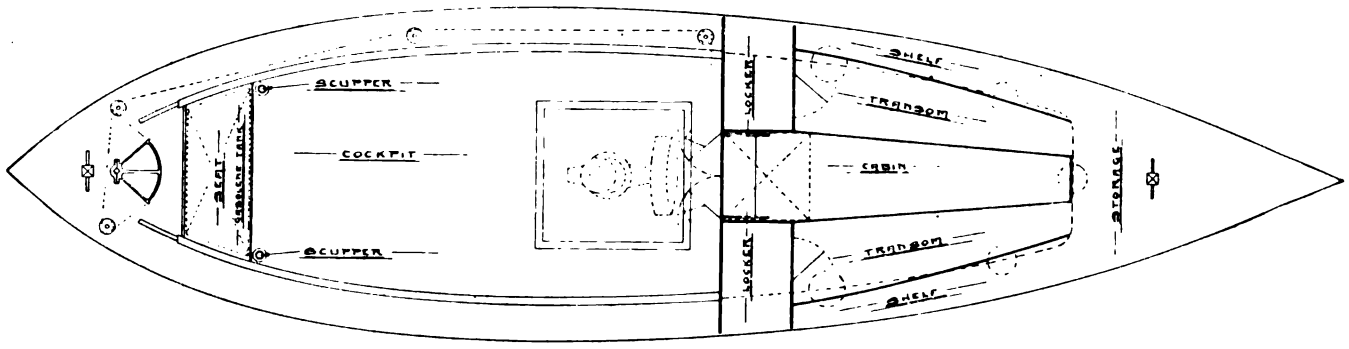

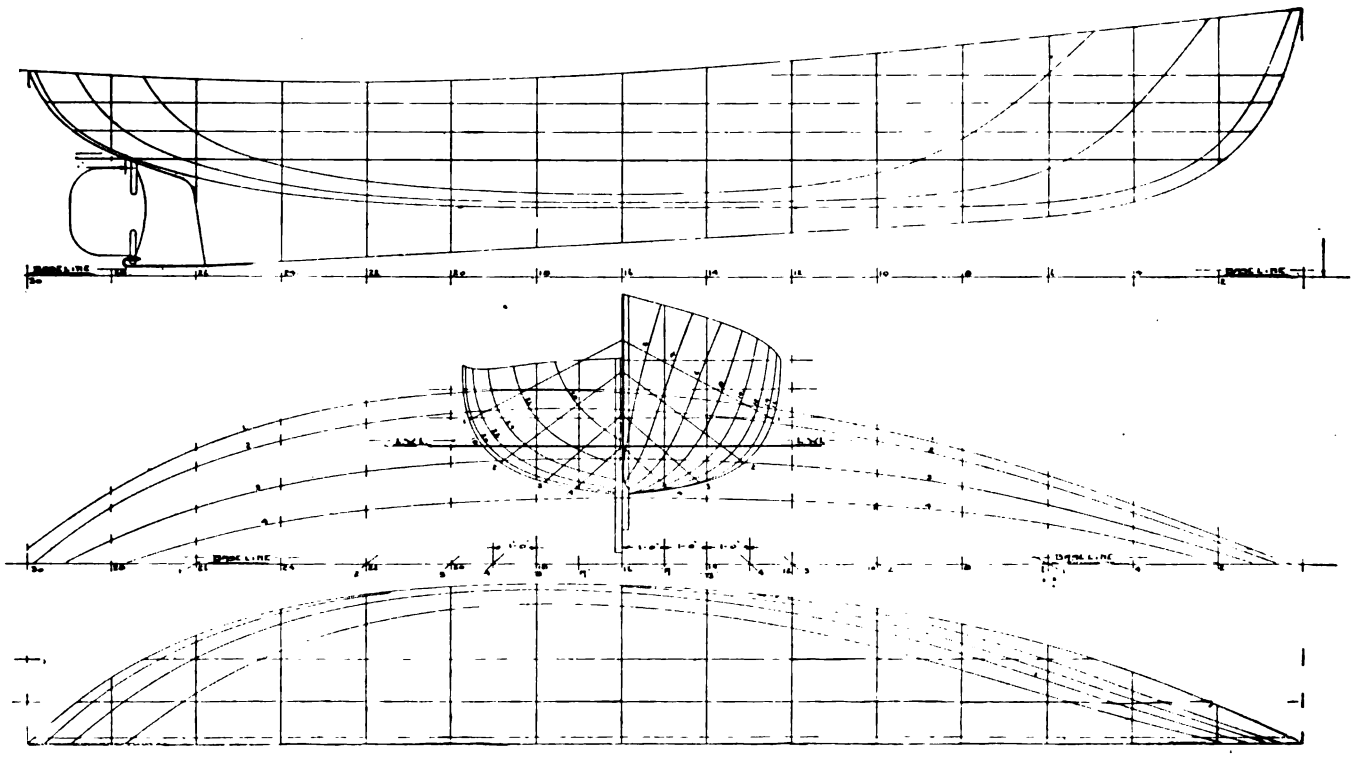

Arrangement Plans and Lines of Thirty-Footer

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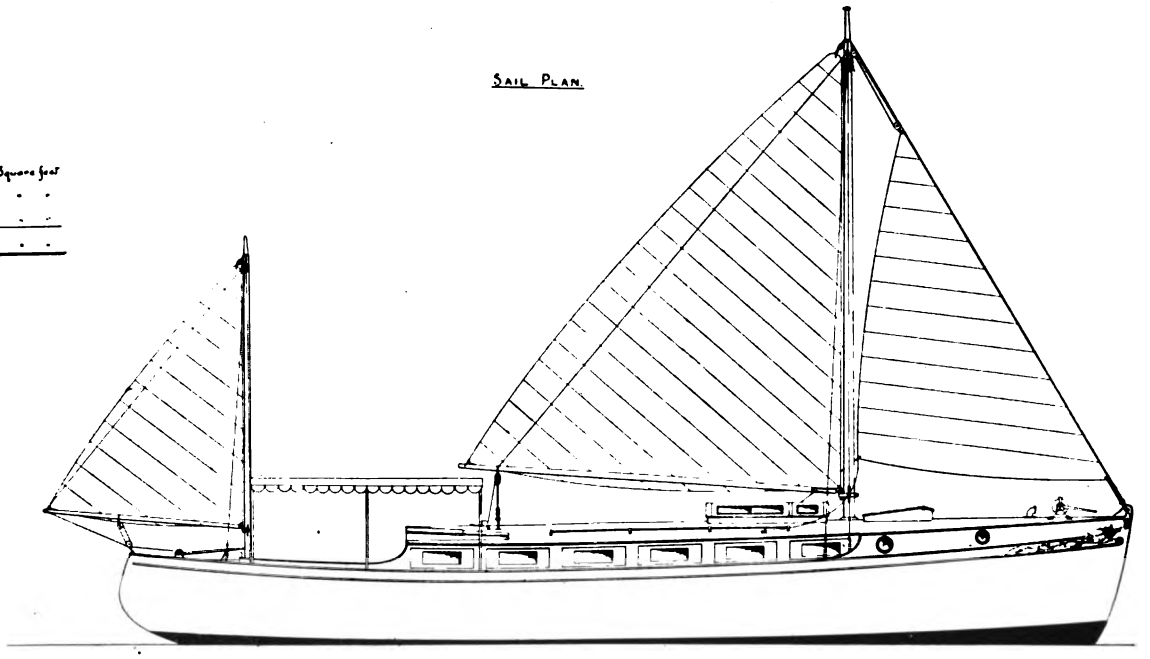
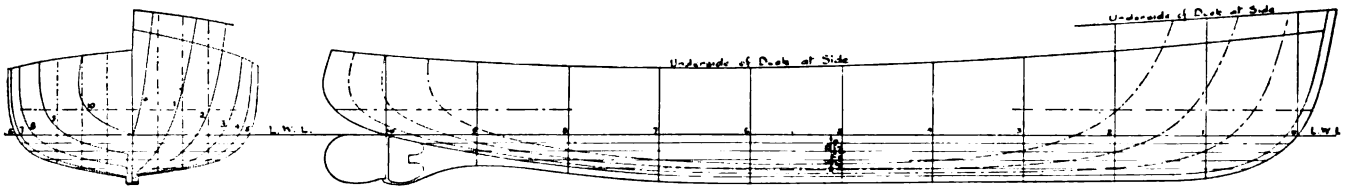
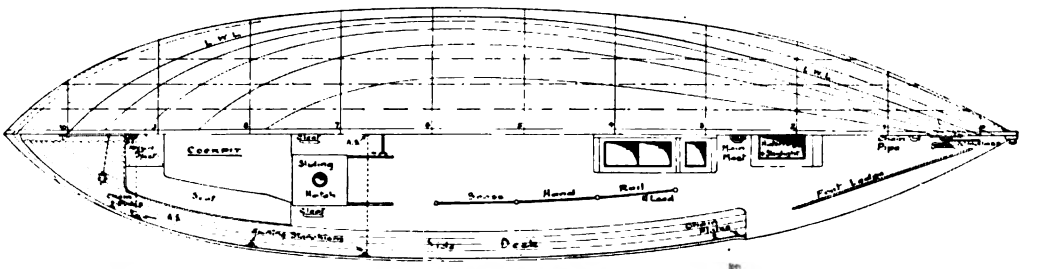
Sail Plan.



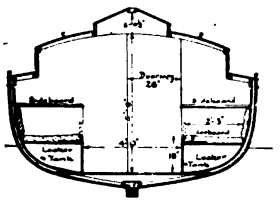
Sail Areas	
Foresail	64 Square feet
Mainsail	132 " "
Mizzen	39 " "
Total	235 " "

Lines

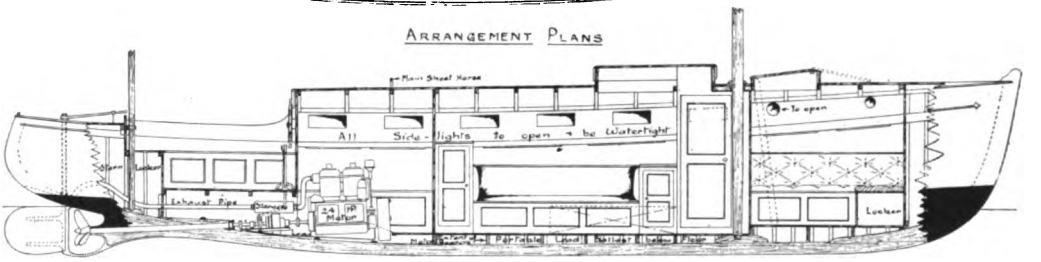




Section thro' Fore End of Main Cabin



Arrangement Plans



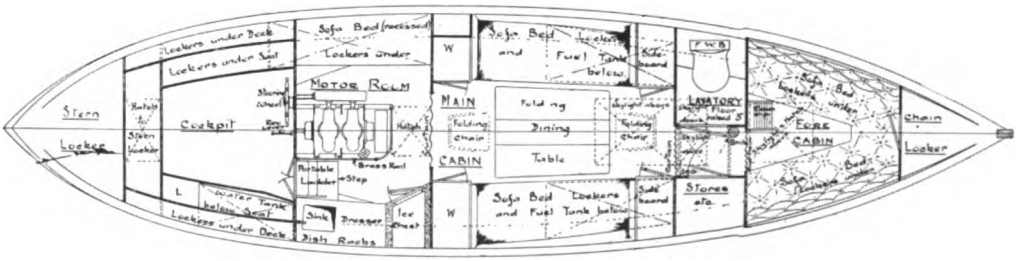
~'Grilse'~

Shallow Draft Auxiliary Cruiser

Length O.A 40ft, L.W.L. 36ft

Breadth 10ft, Draft 2'4 ins.

~Scale ½" = 1ft.~



Shallow-Draught Auxiliary Cruiser. Designed by Charles G. McGregor, Glasgow Scotland

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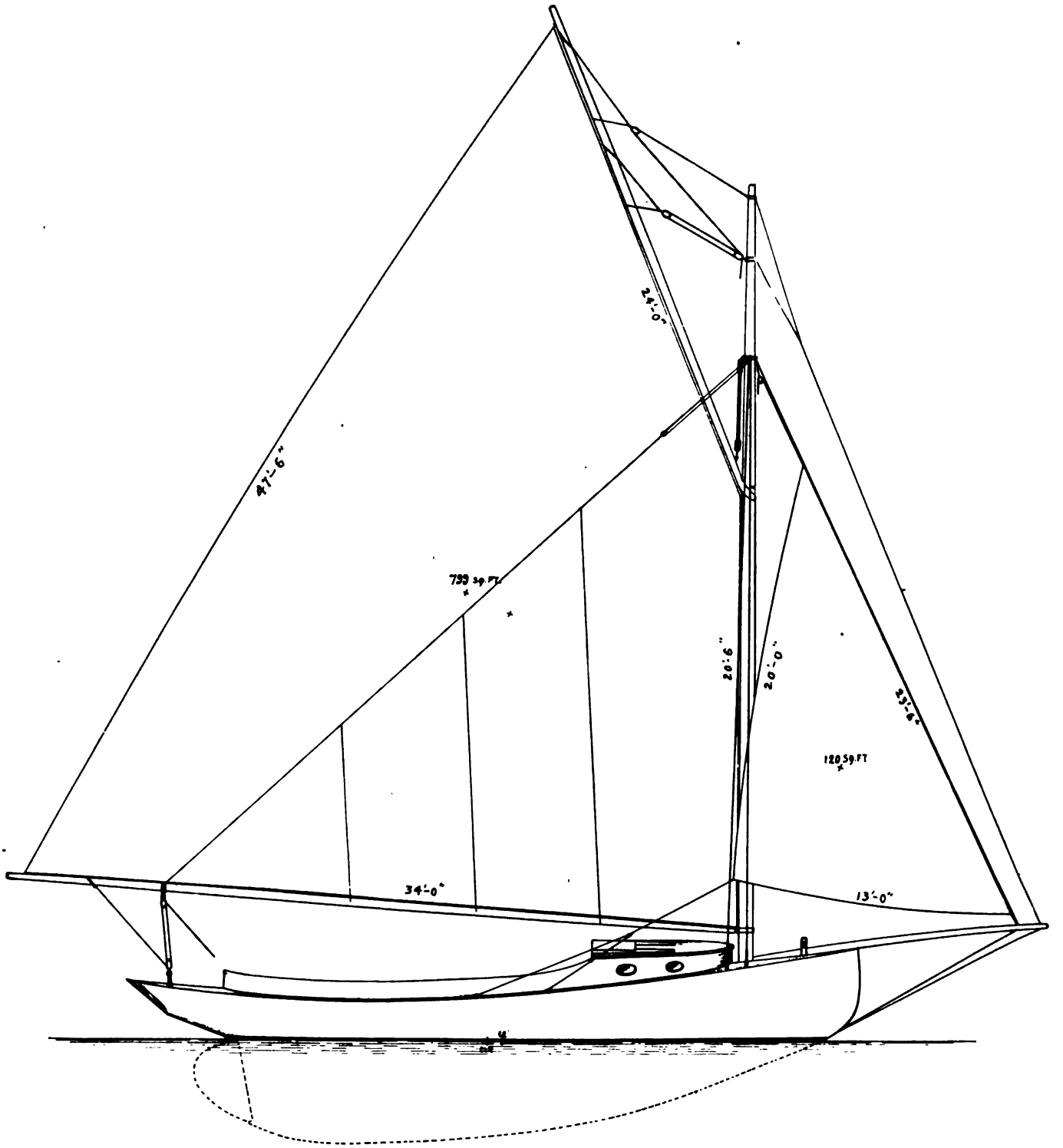

Thirty-Four-Foot Party Boat. Designed by Roy Parris, Somerville, Mass.

THIRTY-FOUR-FOOT PARTY BOAT

THE sloop shown in the accompanying drawing was designed by Roy Parris, of Somerville, Mass., who has the following to say about the craft: "The design was worked up from lines taken from a model made by Captain Wm. B. Harris, who has had many seasons of experience sailing parties at the different Maine Summer resorts. I altered the ends of the boat above water-line to suit my own fancy and drew the sail plan and laid out the interior arrangement. The main part of the boat is given up to a large cockpit with seats all around, with a small cuddy forward equipped with a cooking outfit and the necessary plumbing facilities. As will be seen from the drawings the engine is installed under the hatch in the cockpit." The craft is 34 feet over all, has a breadth of 11 feet 6 inches and draws 5 feet.

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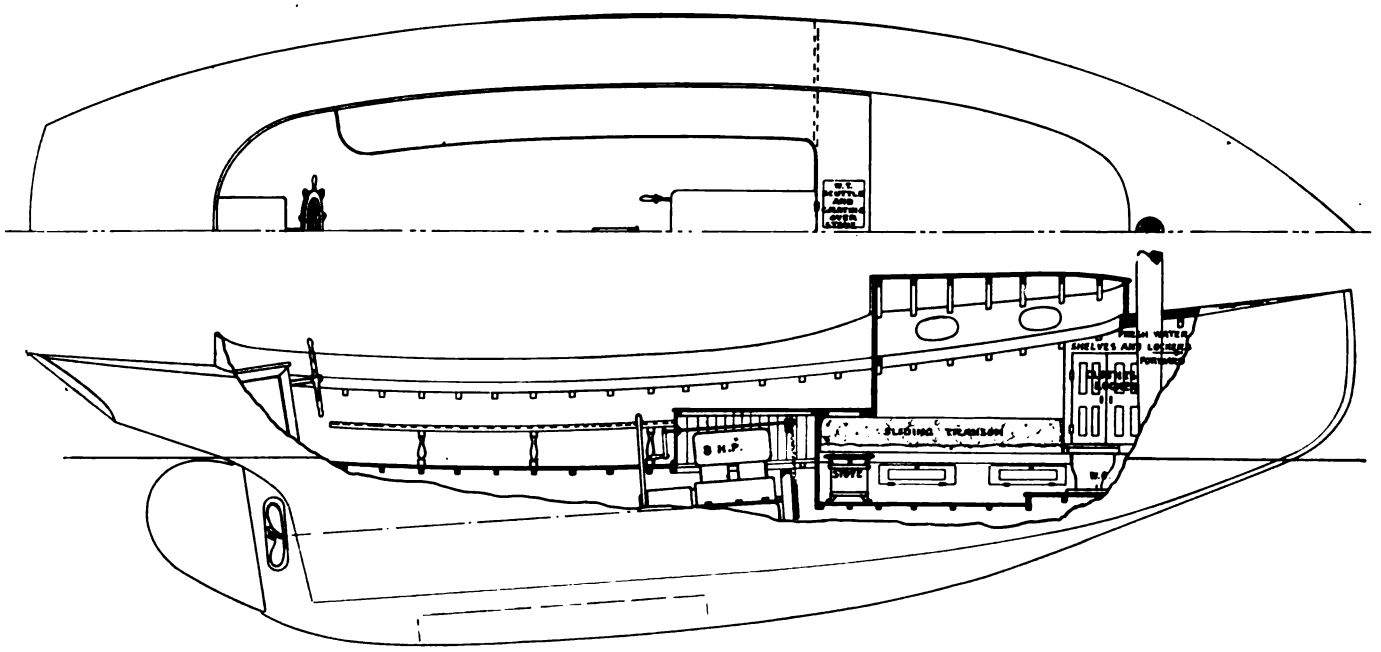

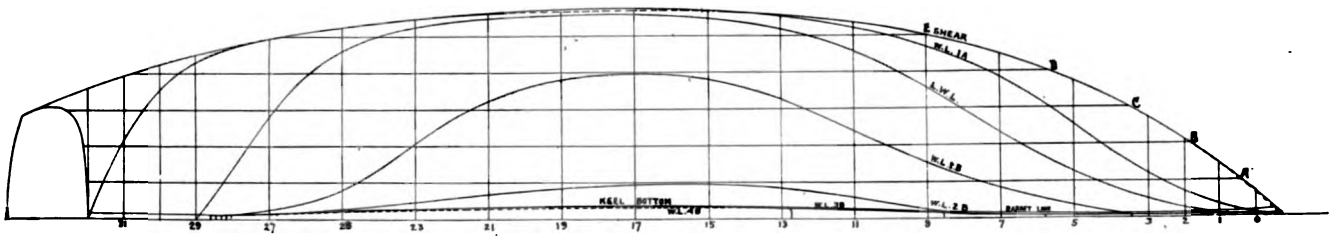

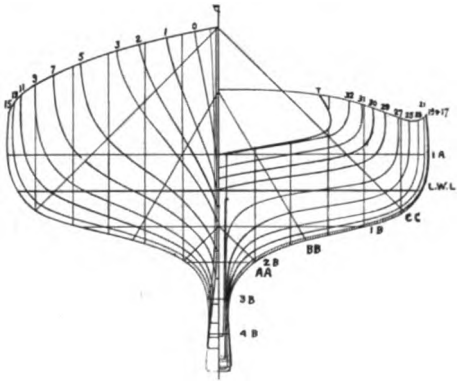

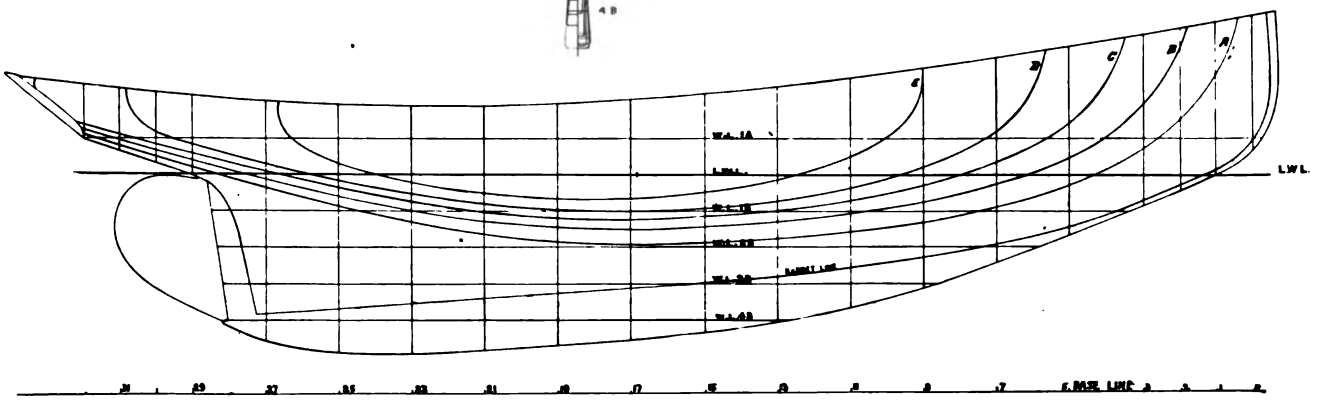

Arrangement Plan and Lines of Thirty-Four-Foot Sloop

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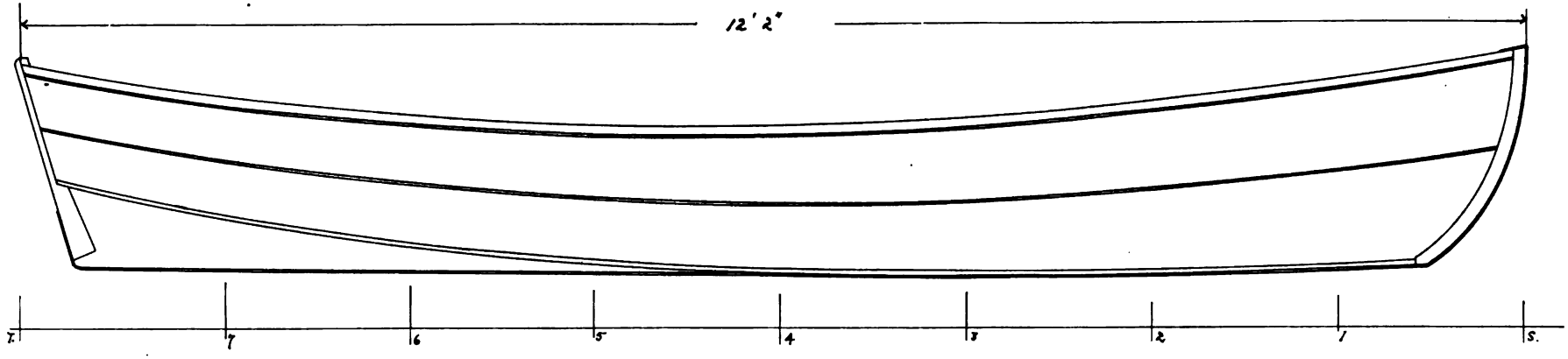

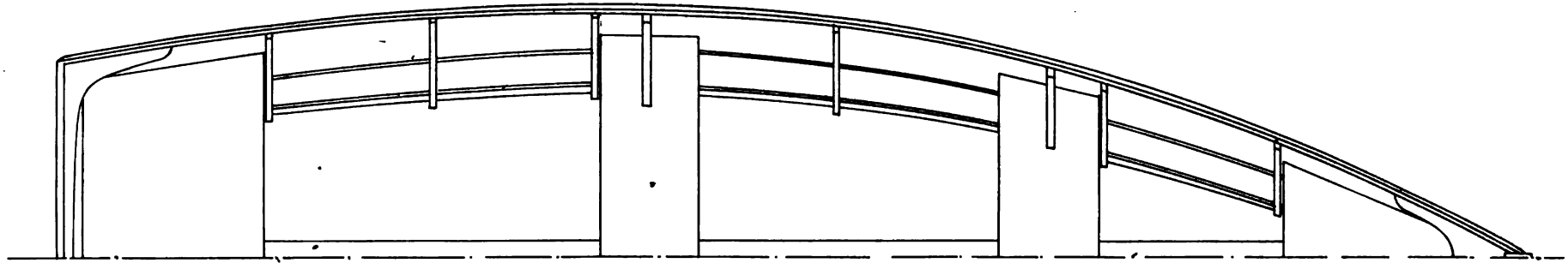

Twelve-Foot Flat-Bottom Tender.—Designed by Roger M. Haddock New Rochelle, N Y.

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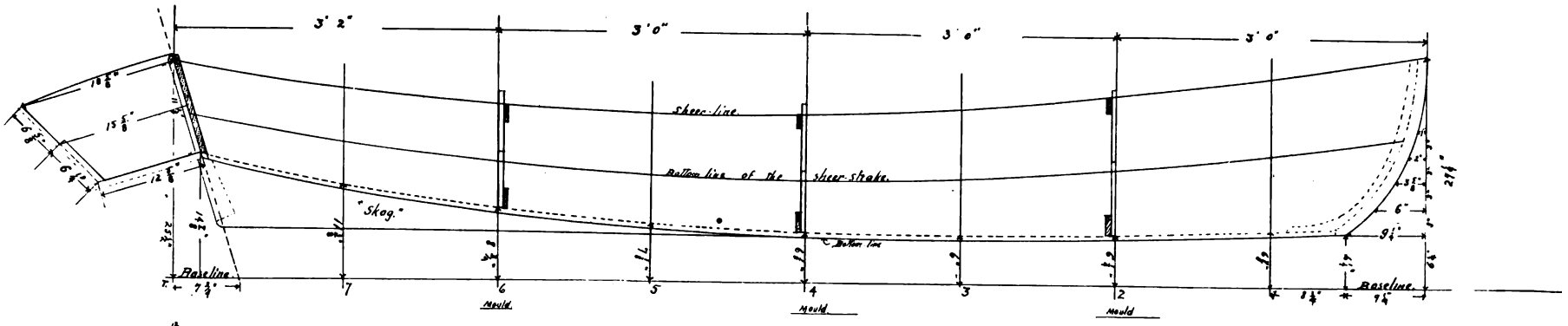
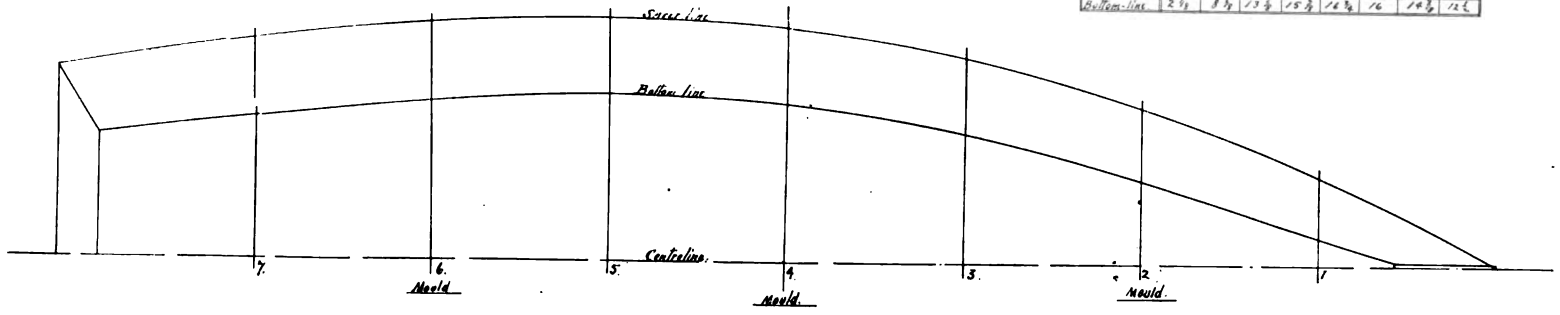
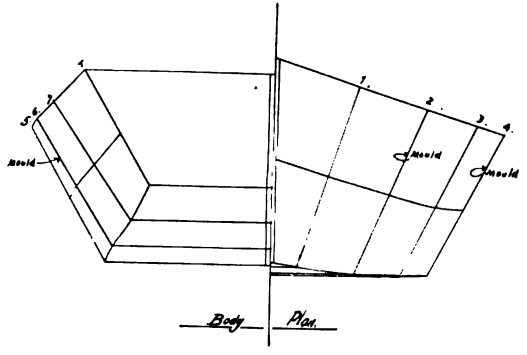
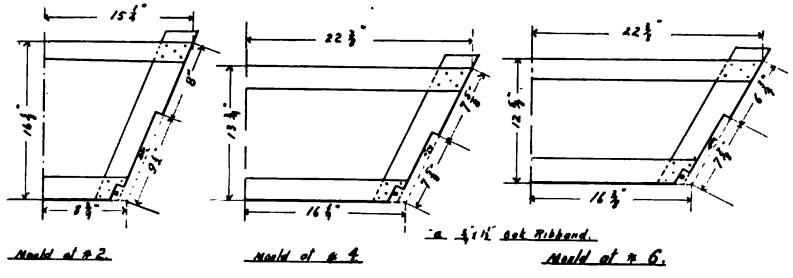


	1	2	3	4	5	6	7	7
Sheer line	24½	22⅛	20¼	19⅝	19⅝	20⅜	22⅜	25½
Bottom line	6	5⅛	5⅛	5¼	6¼	7⅞	10½	19
Sheer line	9	15⅝	20⅛	23⅝	24½	24	22⅜	19⅛
Bottom line	2⅜	8⅛	13⅜	15⅞	16⅜	16	14⅛	12½





N.B. Planking: Sides ¾"; Bottom ⅞".



Full Particulars for Building Tender are Marked on Plans Above

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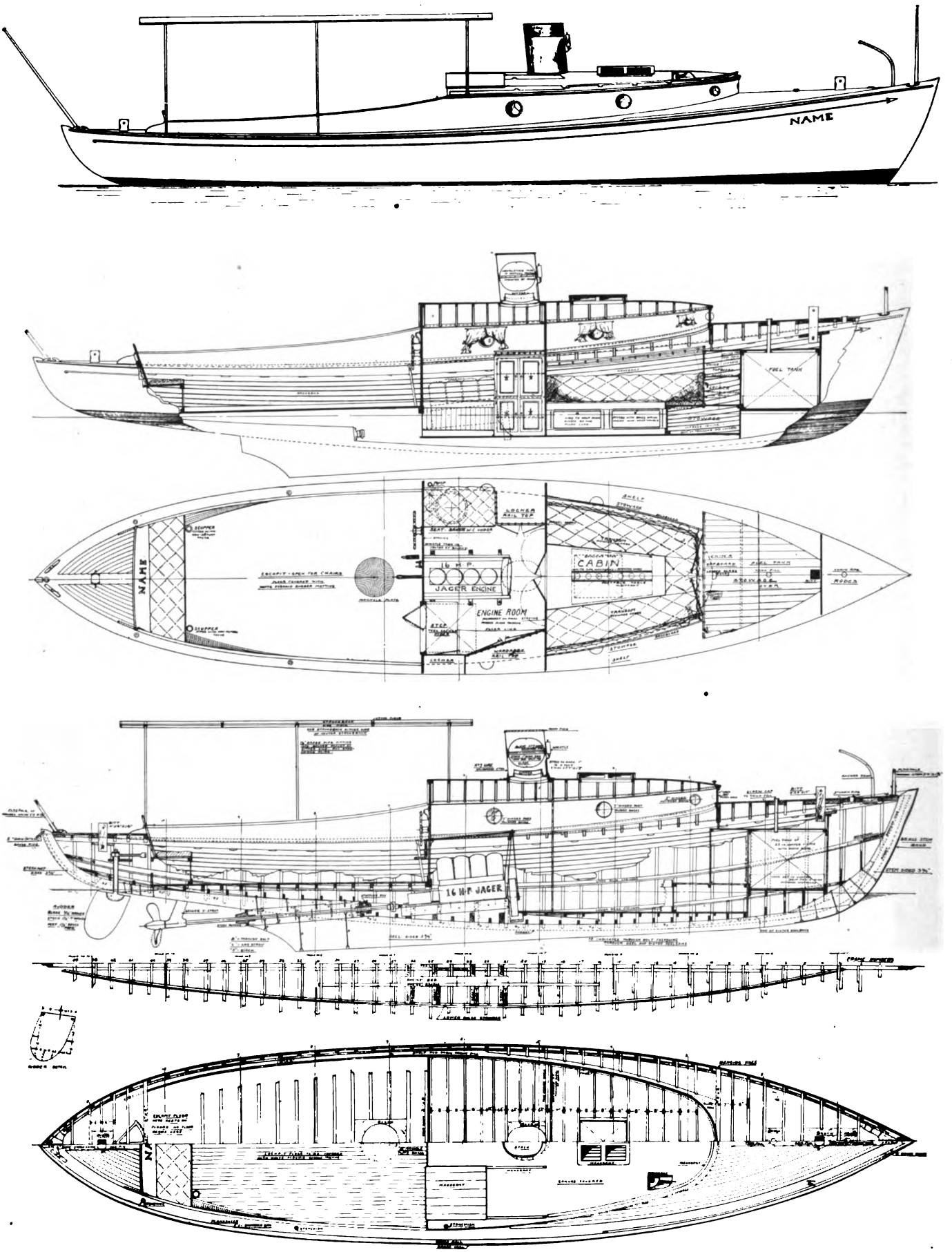

Thirty-Five-Foot Day Cruiser. Designed by Wm. J. Deed, Jr., of Boston, Mass., for F. Stuart Williamson, of New York City

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THIRTY-FIVE-FOOT DAY CRUISER

THE accompanying plans show a 35-foot day-boat from the board of Wm. J. Deed, Jr., of Boston, Mass., for F. Stuart Williamson of New York City.

"The idea in mind was a clean-cut, rakish craft for use on Lake Hopatcong. She will be finished with black topsides, white boottop, and light green underbody. The construction throughout will be the very best and the finish will be mahogany.

The cockpit was made large and left open for chairs, the floor being covered with white pyramid rubber matting, as is also the engine room floor. All controls are brought to the wheel, including the starting gear.

In the engine room is a four-cylinder 16-h.p. Jager engine, of 4 3-16-inch bore by 6-inch stroke. The gasolene tank of copper of a capacity of 75 gallons is forward with stowage room over, and china cupboard in front. The speed will be about 10 miles per hour.

The cabin was laid out for day use only and the height of cabin kept down for the sake of appearance. The headroom provided is 5 feet 3 inches.

Dimensions are as follows:

Length o. a.	35 feet 0 inches
Breadth	7 " 10 "
Draught	2 " 5 "

FORTY-TWO-FT. CRUISING YAWL

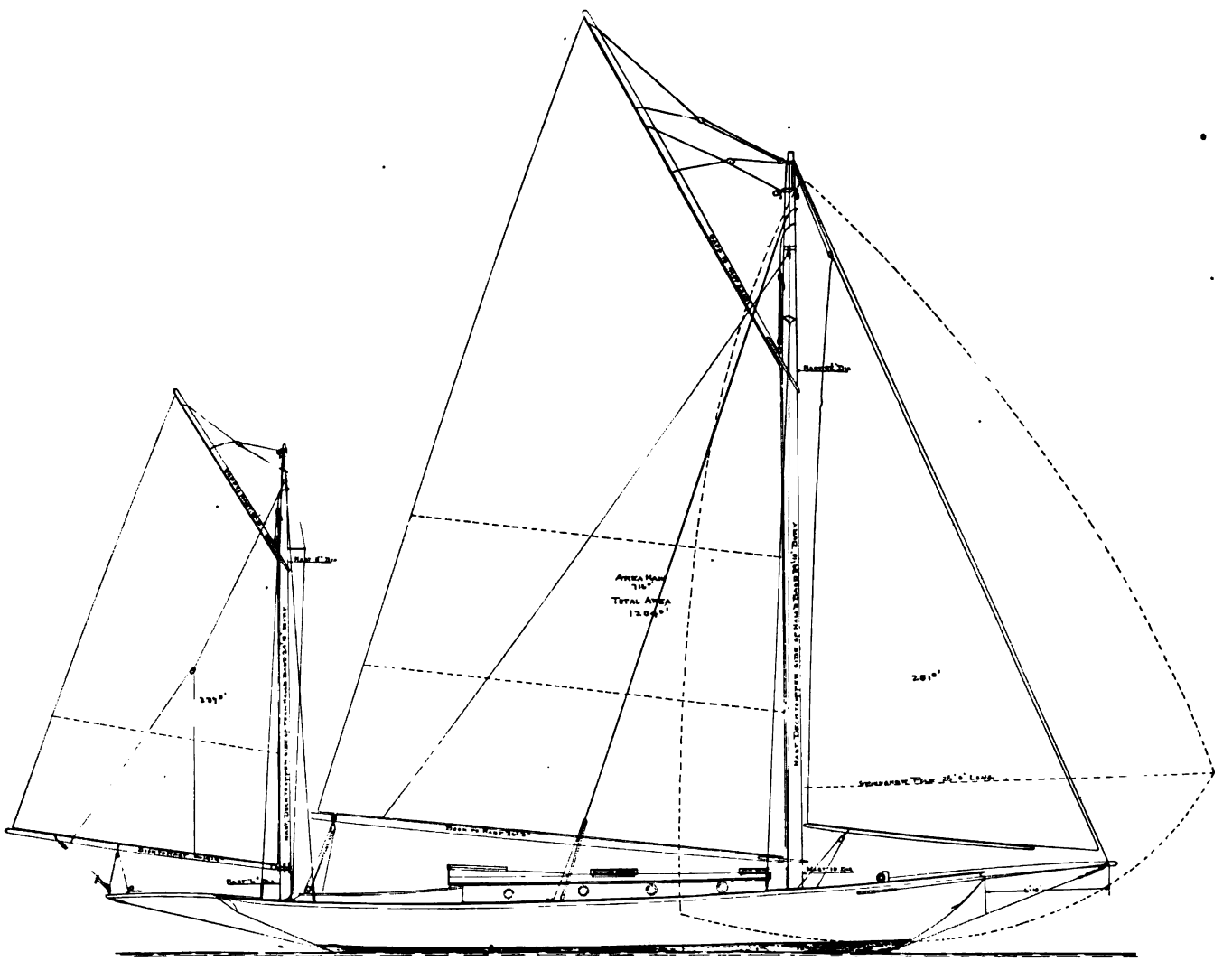
THE cruising yawl shown herewith was designed by John G. Alden, of Boston, Mass., for Mr. A. Babcock, who desired a boat which can be kept in commission late in the Fall, and which would be stiff and able for outside work. The design in general, especially the underbody, is similar to that used by the modern Gloucester fishermen, giving a long keel well aft, in order to insure ease in steering, and about one-half the ballast is inside.

The accommodations are most liberal, consisting of a large main cabin with four berths with drawers under, and two wide transoms, the forward of which are buffets and coat lockers. There is ample storage space under the bridge deck room for an engine if desired.

The headroom is 6 feet 2 inches throughout, except in the forward end of the galley. The toilet room is forward of the main cabin to port, while to starboard extending under the cabinhouse for 6 feet is a large galley with sink, Shipmate and range, etc., forward of which is a fixed berth.

The principal dimensions are:

Length o. a.	42 feet 2 inches
Length w. l.	30 " 3 "
Breadth	12 " 6 "
Draught	6 " 8 "



Forty-Two-Foot Cruising Yawl Designed by John G. Alden, of Boston, Mass., for A. Babcock

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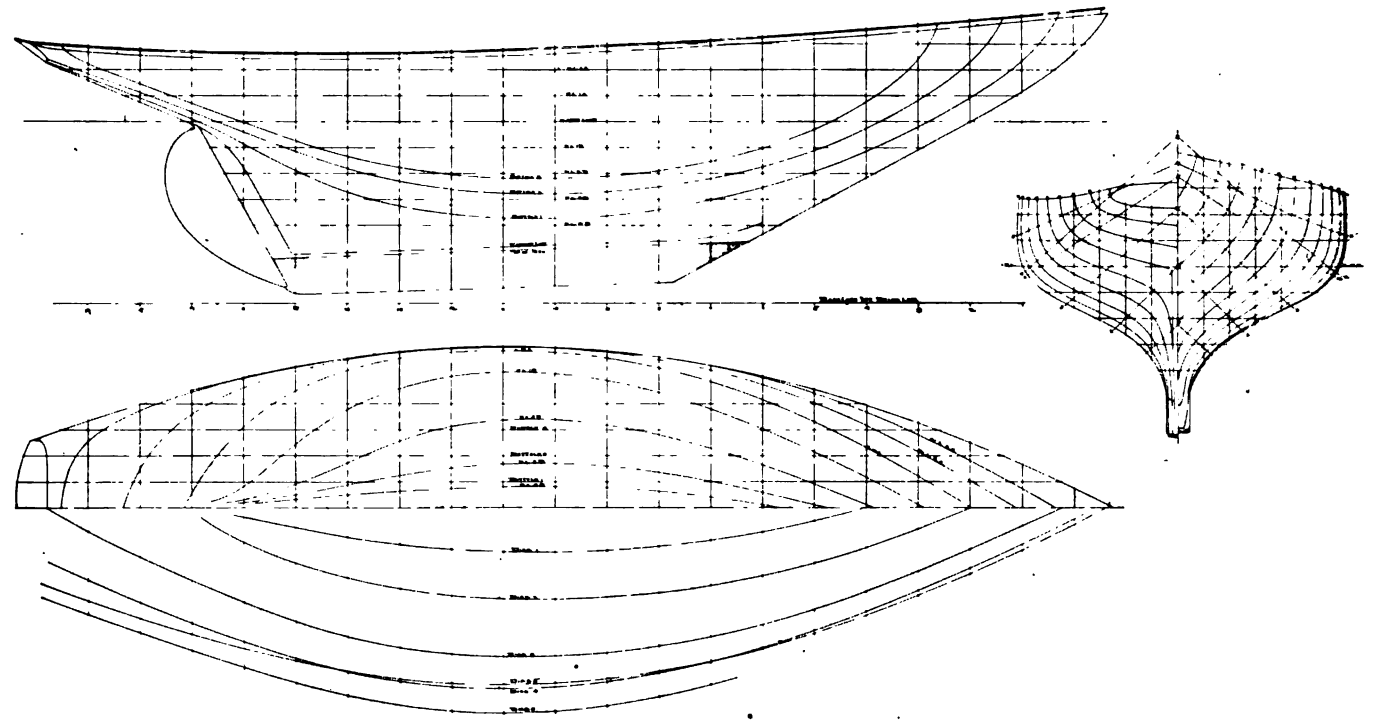

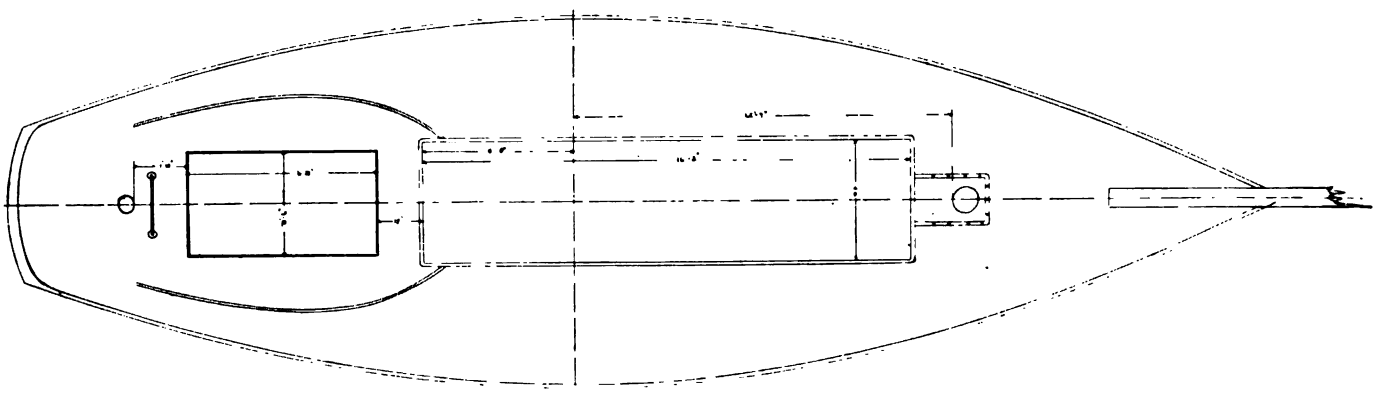

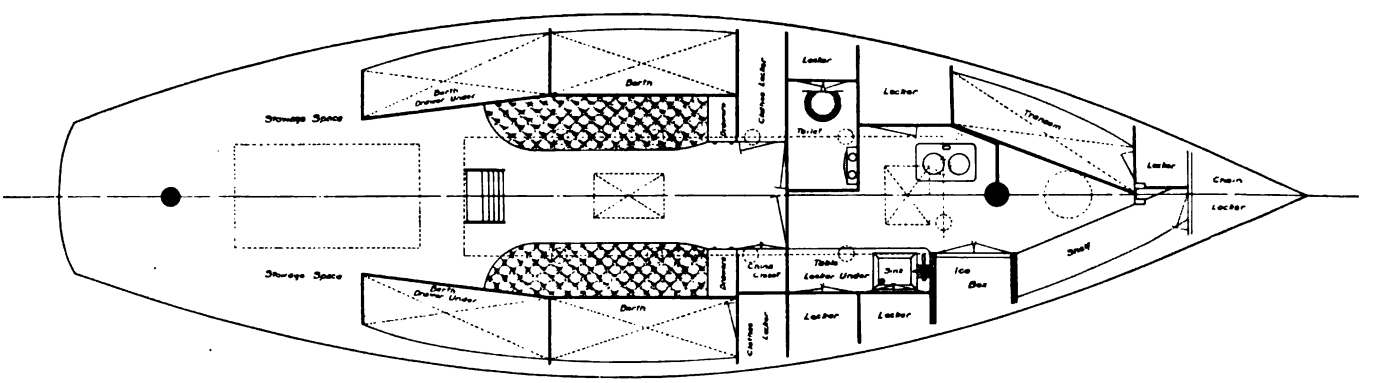

Lines and Accommodation Plan of Forty-Two-Foot Cruising Yawl

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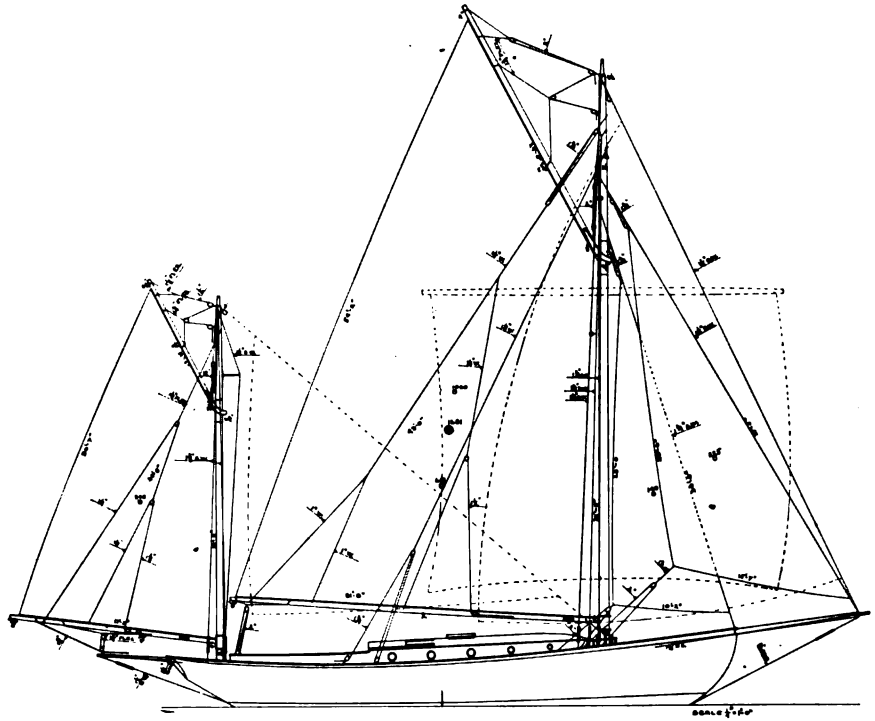

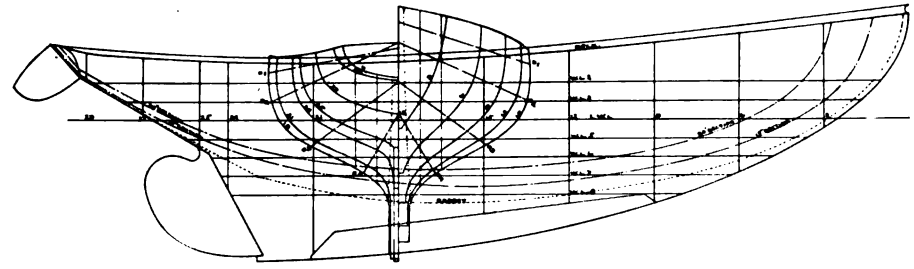

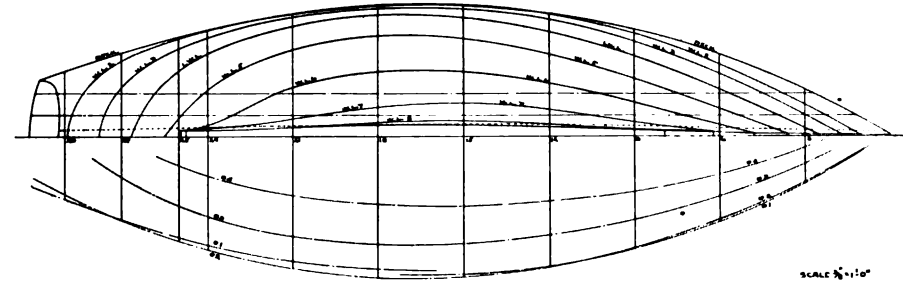

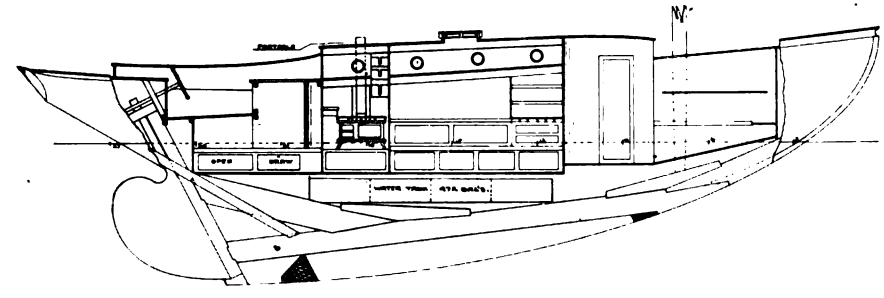

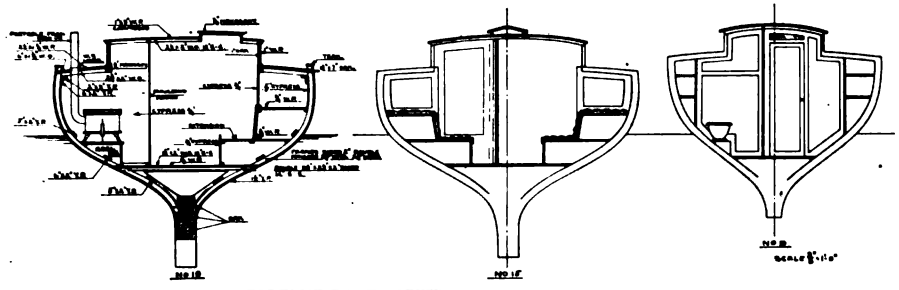

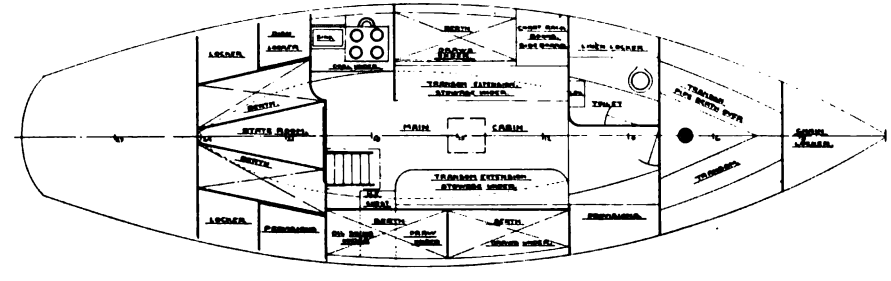

LENGTH OVER ALL	50'-0"
DO L.W.L.	33'-10"
BEAM AT DECK, EXTREME	12'-3"
DO AT L.W.L. DO	10'-2"
DRAUGHT EXTREME	8'-3"
OVERHANG FORWARD	4'-3½"
DO AFT.	5'-11½"
FREEBOARD FORWARD	6'-1"
DO LEAST	3'-3½"
DO AFT	4'-5"
DISPLACEMENT TONS	24.18

BALLAST TONS OUTSIDE	6.31
C.B. AFT OF ⌖ 15'	14½"
SAIL AREA	1691
C. or E. AFT OF ⌖ 15'	7½"
C. or L.R. AFT OF ⌖ 15'	14"
AREA OF LATERAL PLANE	208.28
FRESH WATER GALLONS	47.5
ANCHORS	(2) LBS. 56
CHAINS	40 FATHOMS, STUD⅝
TWO SEA ANCHORS.	
1 SKIFF FOLDING BOAT.	

Cruising Yawl. Designed by E. O. Damon, Jr., Quincy, Mass.

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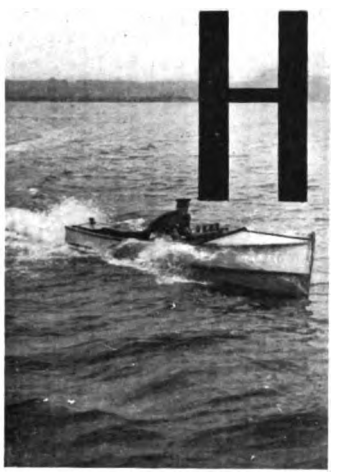
HOW TO BUILD A VIPER

Wilbur H. Young



HAVING read Mr. Albert Hickman's articles on Viper with considerable enthusiasm, I decided to build one of the boats for my own use. The craft was so easy to build and has proven so efficient for her designed purpose that I will be greatly surprised if nearly every navigable body of water in the country where power-boating flourishes, does not float one of these easy-to-build, easy-to-own, little speeders in the near future. Besides being very fast, Viper is a wonderful little sea-boat, being staunch and stable. I know she is cheap, for I built one for $39.10, and I know she is staunch and able because I have had her out in some pretty strenuous weather in Lower New York Bay and among the traffic-stirred waters of the Hudson in the vicinity of New York City; but more of this later.

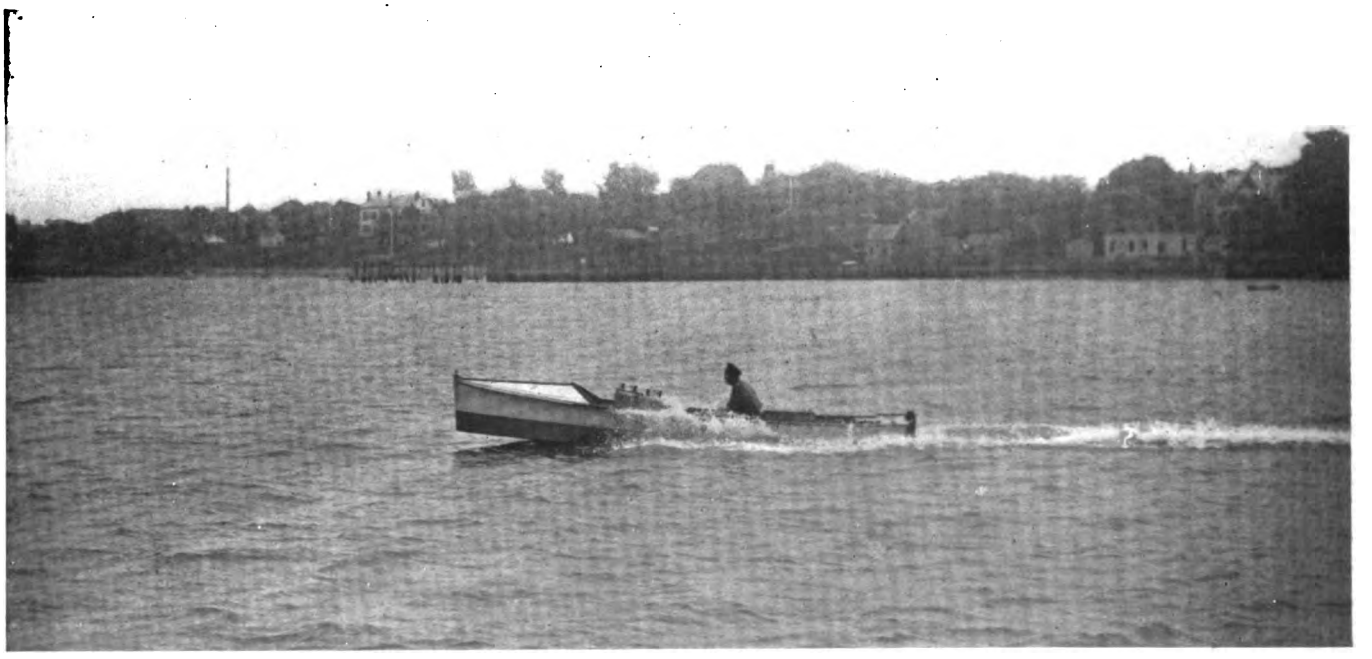
As Mr. Hickman has given a great deal of valuable information to those desiring to build one of these hulls, I will confine myself to telling why and how we built Lackawanna V, and trust that our experience may be of some small help to others who desire to have a speedy, safe little craft that will show her heels to many a high-priced, heavily-powered craft without having to spend the income from a small fortune.

About four years ago, Captain John Rogers of Keyport, N. J., built a small hull 20 feet in length by 4 feet over-all breadth with a flare to its sides bringing the breadth water-line to 3 feet 7 inches. The stern was narrowed somewhat more than Viper's and the bottom slightly rounded. A box keel was used, projecting below the boat 6 inches aft running to nothing forward.

This hull was sold to Mr. William H. Watts, also of Keyport, who removed the bottom, replacing it with one that was absolutely flat across the bottom, and a curve fore and aft of 3 inches in the whole length. This model was very similar to Viper and with a 10-11-h.p. engine made most remarkable speed, obtaining as much as 18.6 miles per hour, and showed very good seagoing qualities. Consequently, when I read Mr. Hickman's first article in the March RUDDER, I showed it to my father, who has built a number of different kinds of craft, and we promptly became very enthusiastic.

I immediately communicated with Mr. Walter Bieling of THE RUDDER, asking him if he had the offset table. He informed me that it would appear in the April issue. When this appeared, father and I started in to build.

Following Mr. Hickman's advice as to weight, we built her with the idea of strength first, as the dimensions given will show. We had first to find a place to build her, the only available one being the basement of the house, a room only 16 feet by 20 feet, but by knocking



Viper, Built by Mr. Young, at Full Speed

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out a window and sticking the stern through we had just enough room to get around. I then made a working drawing from Mr. Hickman's table, using the scale of 3 inches to 1 foot, and then laid down the lines on the floor. We then purchased the oak, cedar, and the nails and screws, etc. The table given on page 92 shows the amount required and the tools necessary, so that the amateur boat-builder may, without any special difficulty, build as substantial a craft as we have. We could not get white cedar for the entire boat so used some so-called Oregon red cedar for the bottom. The sides and bottom are of 1-inch stock dressed down to ⅞ inch which, while not conducive to lightness, produced a very strong and substantial hull for a 20-foot speed boat.

From the lines, after being laid down on the floor, we cut all of the floor timbers and frames out of 1 by 2-inch oak, the chime or corner piece being of 1½ by 1½-inch oak. The corner piece, floor and vertical timbers were notched where they come together, as shown in Fig. 1.

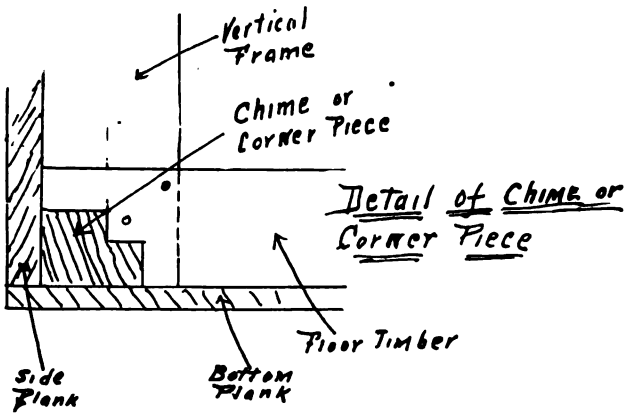

Fig. 1. Detail of Chime

The corner pieces were then fastened to the stem previously worked out of oak 4 by 6 by 30 inches (Fig. 2), and floor timbers numbers 4, 8, 11, 16 and 19 fastened in with 2-inch galvanized wire nails, giving the bottom its shape. We made some clamps to hold the corner pieces while fastening, of 1 by 2½-inch oak by bolting a block on each end and using wedges as shown in Fig. 3. Holes were bored 2 inches apart as shown to accommodate the varying widths. We then fitted in the rest of the floor timbers and fastened the vertical frames, 4, 8, 11, 16 and 19 and the stern-board, which latter was made of 1-inch cypress, of dimensions shown in the table. Braces of 1 by 3-inch spruce were cut in between the vertical frames and ribbands of ½ by 1-inch spruce run fore and aft on the top of the frames both sides to hold the frames in place when the side planking was put on. The rest of the vertical frames were then fitted in.

We did not agree with Mr. Hickman's conclusions regarding the shaft angle particularly as Mr. Watts had obtained an increase of speed from nearly 17 miles per hour to 18.6 miles, by simply lowering the shaft angle from 14° to 10°, so we used two keels, or keelsons, spaced far enough apart to allow the engine beds to be placed in between, and permitting us to lower the shaft angle to 8°. These keelsons were made of 1¼ by 6-inch spruce (Fig. 4, p. 90) running from the 5th frame to the stern-board and were notched over the floor timbers making a very substantial job.

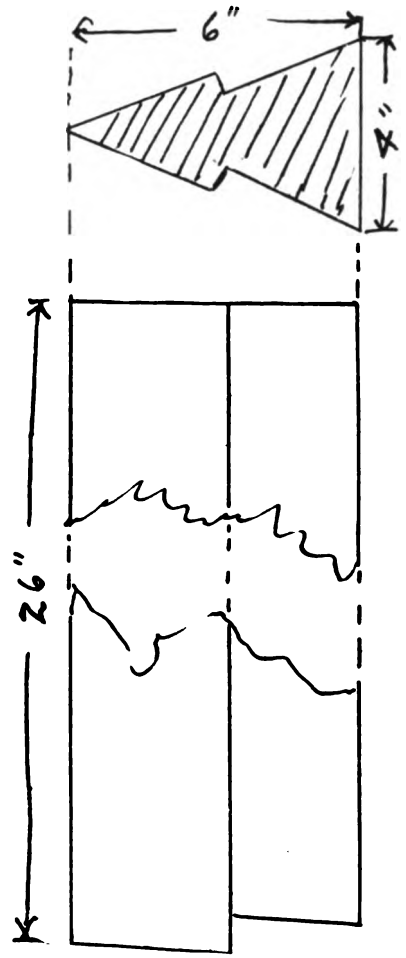

Fig. 2. Stem Detail

The keelsons were first shaped on the bottom according to column No. 2 of the offset table and the bottom of the boat as now finished was placed across the saw-horse 3 feet from the bow, and the window sill above mentioned served as a support for the stern, after which pieces of 2 by 4-inch hemlock were wedged in between the ceiling of the room and the bottom frame to bring the frame to the proper curve. The keelsons were then fastened with 2-inch galvanized wire nails to the floor frames and to the stern-board.

The sides were made in three strakes, each of full length ⅞-inch white cedar. As the sides have no flare, column No. 2 of the offset table gave the curve for the bottom strake. After getting this strake sawed out

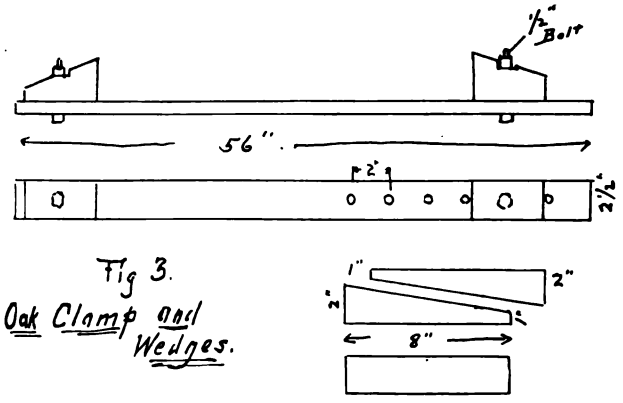

Fig 3.
Oak Clamp and Wedges.

Fig. 3. Oak Clamp

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and planed on both edges, it was laid down on the planks for the next strake, and the top edge marked to give the shape of the bottom of the second strake. The same was done for the top strake.

The curve of the top edge of the top strake was obtained from column No. 4 of the offset table and the planking nailed on with 2-inch galvanized wire nails, beginning at the stem with the bottom strake. All nail heads were set in to allow for puttying after the first coat of paint was given.

We then turned the boat over and put on the bottom plank, also with 2-inch galvanized wire nails. The center plank was made wide enough to cover between the keelsons and fastened, and shaft log, rabbeted and fitted as shown in Fig. 5. The planking was then planed off all over, the sides being given a coat of white lead and raw oil, the bottom a coat of green paint. Inside we applied two coats of raw oil.

The two pieces for the engine bed were then installed, notching over floor timbers and bolting through

Fig. 5. Detail of Shaft Log and Rabbet

the keelson. These pieces were of 3 by 10-inch yellow pine.

The shaft log was made of 4 by 6-inch yellow pine and rabbeted through the floor also notched over the floor timbers (Fig. 5).

We notched a piece of yellow pine 4 by 8 inches tapered off to 4 by 4 inches 3 feet long into the stem and over the floor timbers, also one of the same dimensions at the stern (Fig. 6).

The plank sheer was made of oak 1 inch by 3 inches sprung around on top of the vertical frames and notched half-way in, after which an oak clamp ½ inch by 4 inches was made. This was wide enough to serve as a slight washboard. A ribband of oak for wearing streak was then put on the outer edge.

The spray boards were made of oak 1 inch by 9 inches to the 7th frame and of 1 by 9-inch cedar from there to the 15th frame, oak being used forward for strength, as the boat receives an occasional hard knock there. This width was necessary on account of the curve to the sides, the average projection beyond the sides being about 4 inches. I find the spray boards to be an immense advantage in a sea-way, as they throw the spray out sideways and down instead of allowing it to rise to be blown over the boat.

A V-shaped deck was built over the bow extending 6 feet back from the stem, made of ¾-inch tongued-and grooved spruce laid on deck timbers of 1 by 2-inch oak which were notched into a ridge pole of 1½ by 1½-inch oak. The tongued-and-grooved boards were made 2 inches wide and put on diagonally and finished with a coaming at the after end. We put a deck aft, 2 feet 2 inches long, made similar to the forward deck except that it had a crown of 2 inches.

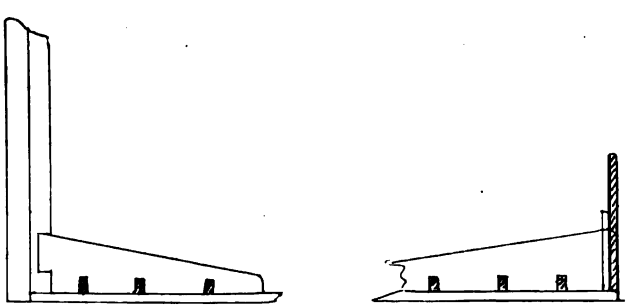

Fig. 6. Showing Method of Bracing Stem and Stern

We then put in three thwartship seats.

The rudder was made as shown in Fig. 7, of 3/16-inch sheet brass inserted edgewise into a piece of 1-inch oak and riveted with brass rivets. It was supported by two brass eye-bolts at the top and two at the bottom, with a brass rod through the whole (Fig. 7).

We were now ready to install the engine. We had first thought of using about 12-h.p. but Mr. Hickman's article in the May RUDDER telling of the results obtained with higher horse-power having aroused our enthusiasm to such a high pitch we finally decided upon a four-cylinder, two-stroke, 4½-inch bore by 4½-inch stroke, 27-h.p. Lackawanna engine, with an aluminum base, which came up to expectations and gave excellent service.

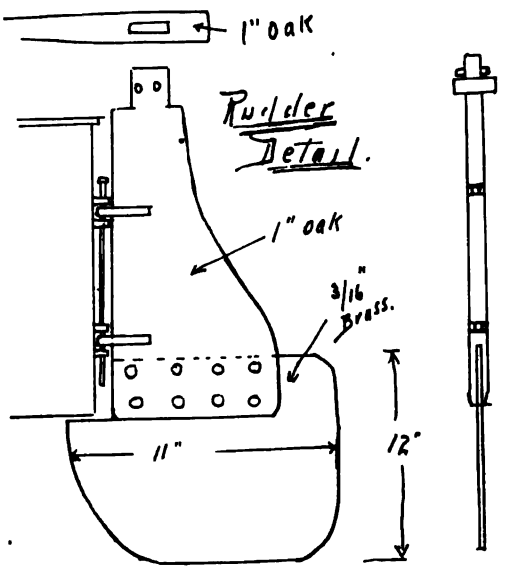

Fig. 7. Showing Rudder Construction

This engine weighed with full equipment including shaft, propeller, coils, etc., 480 lb, so we made our engine bed of 3 by 10-inch yellow pine long enough to take the engine base and fastened the engine down with hanger bolts ½ inch by 6 inches.

Hanger bolts are preferable to lag-screws as they allow of the removal of the engine without removing the bolts, which is very convenient where re-alignment is necessary.

For a strut, a manganese bronze casting was made by the people who made the propeller. This strut is of the single leg type made large enough to allow of pouring the bearing with babbitt.

At first we used the ordinary coils and spark plugs, but when running against a stiff wind we found the spray would get in the wiring in spite of anything we could do to prevent it, so we finally installed four Orswell plugs and a vibrator which worked very well indeed, giving us absolutely no trouble.

The gasolene tank was installed at first under the deck forward but was so heavy (65 lb empty, 210 lb full) that we removed it and put a 15-gallon square tank just aft of the center frame and in the middle of the boat, allowing eight inches fall between the bottom of the tank and the top of the carbureter.

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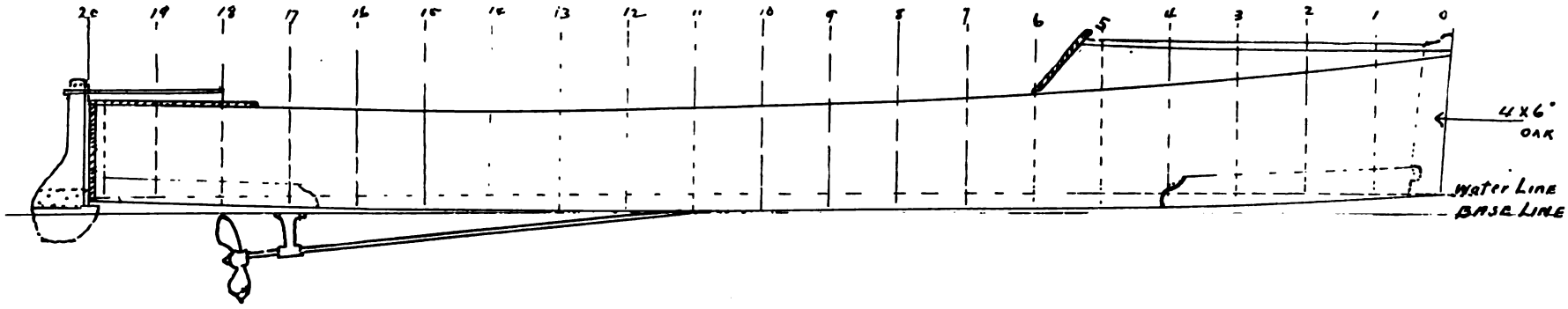
VIPER PROFILE



Length over all on top 20'2"

Line of forward deck parallel to base line

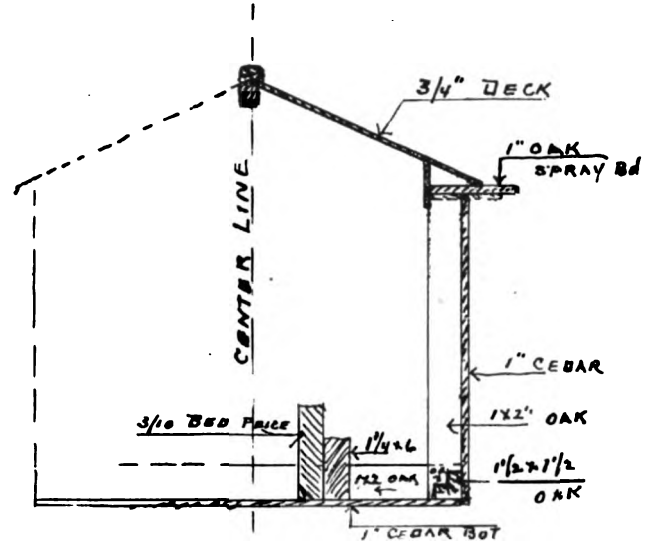
Stern board at right angles to base line

Shaft cuts base line at angle of 8°

Centre of shaft cuts outside of bottom plank 11 Ft from bow

Length of forward deck 6 Ft

Length after deck 2·2



SECTION AT STATION 5

Stations 1' apart beginning at bow

Station	Rise of Bottom	B.W.L.	Widths of Sides.
0	2 3/4	0	26'
1		8 5/8	24 1/16
2		16'	22 3/4
3		21 5/8	21 5/16
4		26 1/8	21
5		31 1/4	20 1/16
6		36 1/8	19 5/8
7	3/4	39'	19 1/4
8	1/2	41 1/2	16 13/16
9	1/4	42 1/2	15 3/4
10	1/16	43 3/8	
11	0	43 1/2	
12	0	43 3/8	
13	1/8	42 5/8	
14	5/16	42 3/8	
15	9/16	42	
16	15/16	41 3/8	
17		40 5/8	
18		39 1/2	
19		38	
20	2 3/4	36 3/8	17'

Building Particulars of Viper

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Right here let me say that it is far better to have a large diameter gasolene pipe than a small one. We had 3/16-inch copper tubing at first, which stopped up frequently even though the gasolene was strained through a chamois, but when we put in a ⅜-inch brass pipe we had no further trouble.

We also found that by mixing one pint of lubricating oil with every 5 gallons of gasolene before straining through the chamois, we eliminated entirely the necessity of continually watching the oil cups. As one's hands are full when handling the boat and timing her over a course, any additional anxieties are unnecessary.

We made a canvas cover in two pieces, one covering

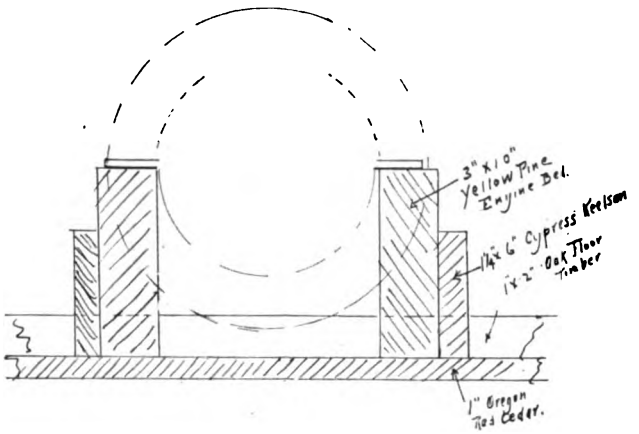


Fig. 4. Detail of Engine Bed and Keelson Construction

the entire engine equipment and one running from there to the stern deck for keeping out the rain, but when running, unless blowing very hard, we do not use either, as the boat is exceptionally dry.

So much for the description; and now for the performance.

We tried several different propellers but obtained the best results with an 18-inch diameter by 36-inch pitch, two-bladed wheel, made by the Columbian Brass Foun-

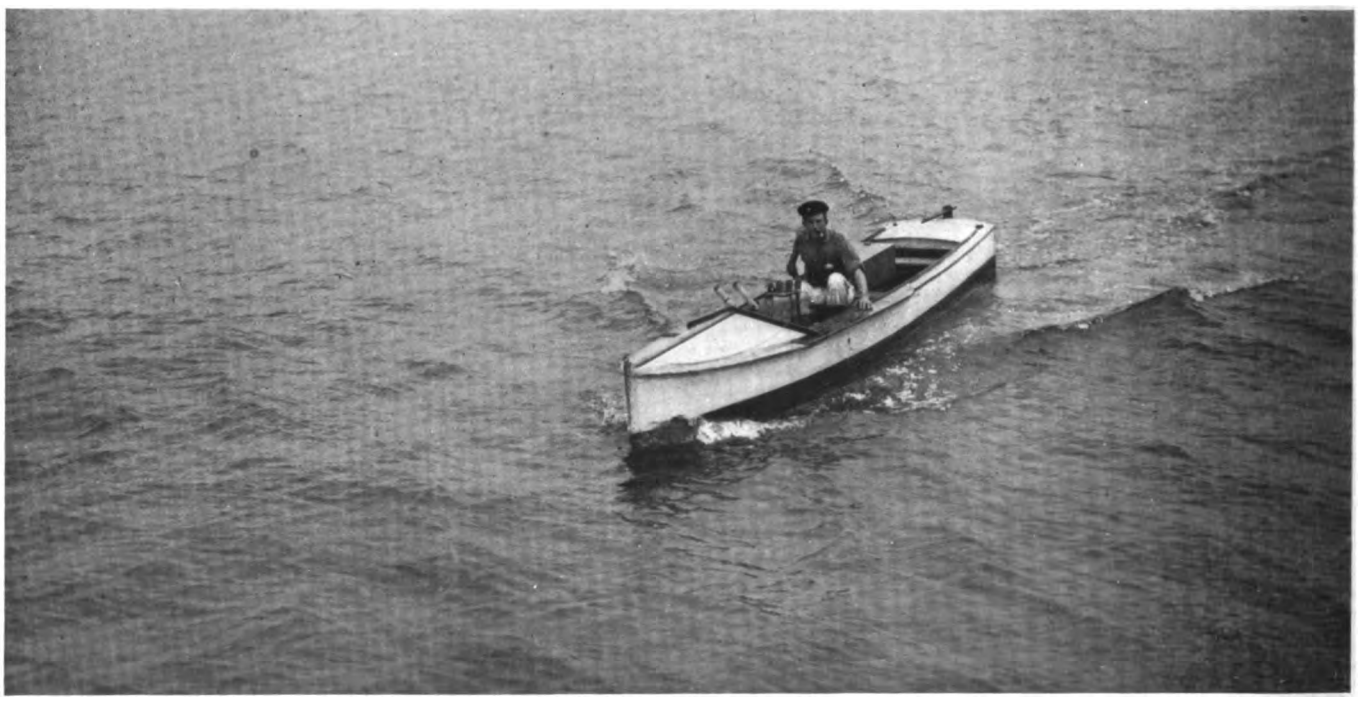
Showing Four-Cylinder, 27-H.P. Lackawanna in Viper

dry. This wheel had a blade area of approximately 70 square inches and the engine turned it at 875 r.p.m., at which revolutions we traveled over a 2000-foot course in 57 seconds or a speed of 24 miles per hour.

With an 18-inch diameter by 30-inch pitch, two-bladed wheel with same blade area turning at 980 r.p.m. we took 62 seconds to travel the same course. With the latter wheel we made a trip of 16 miles (measured on Government chart) in 45 minutes with two in the boat.

Over the 2000-foot course (which course by the way was measured with a steel tape over the ice and afterward checked with a stadia transit and with three angles and a base line measured) we have easily made 22 miles per hour, timed by a stop watch in the hands of an experienced timer.

On another page are shown the lines of the craft, which the reader will notice are identical with those published in the April RUDDER with the exception of the deck, which we changed slightly. I have also in-



With Power Shut Off

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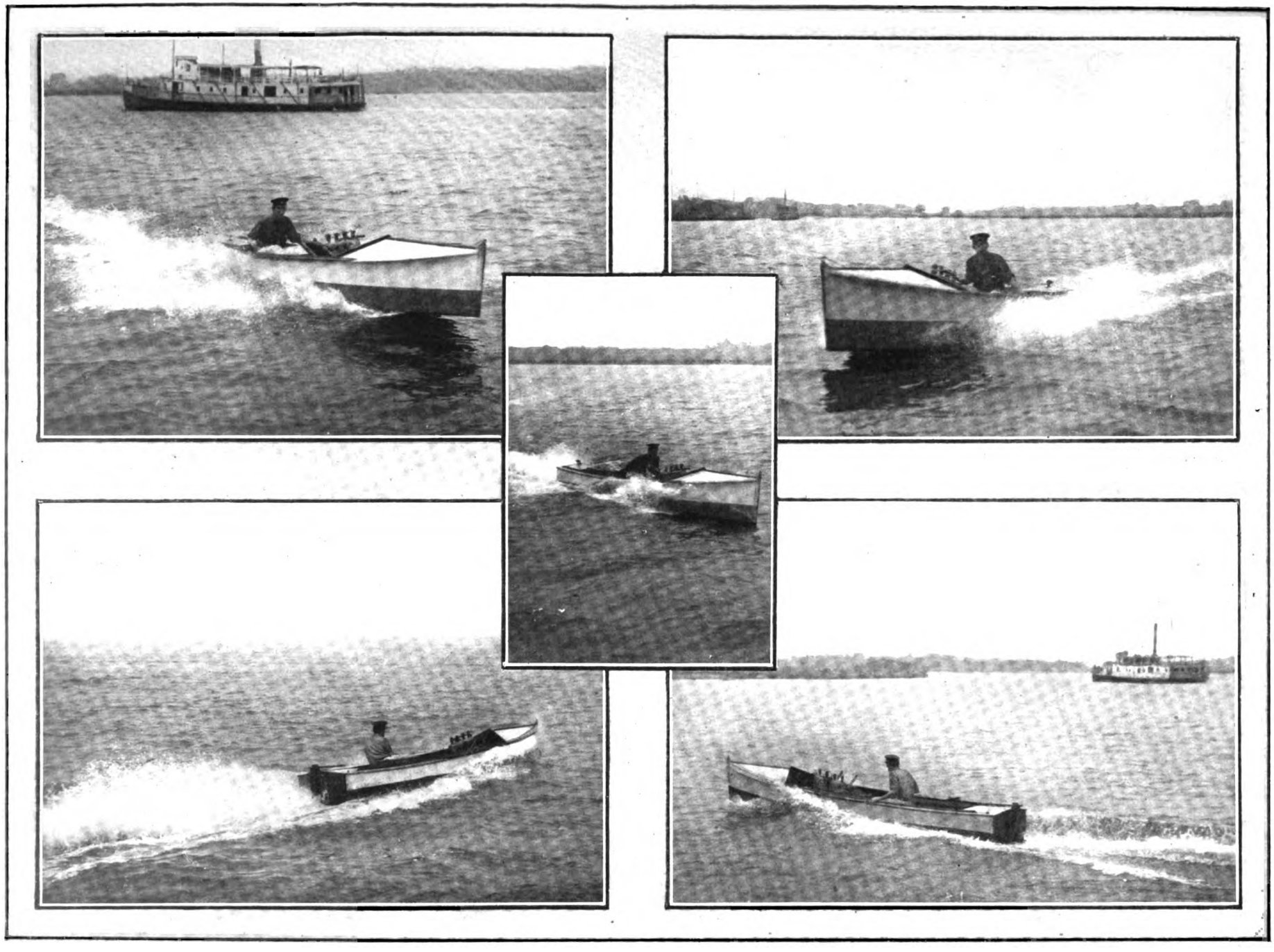

Viper, Built by Wilbur H. Young, Keyport, N. J.

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cluded the table of offsets, which were published in Mr. Hickman's article, for convenient reference by the readers of this article.

Weights are given also with engine and propeller data

Personally, I think if the hull were built lighter, say ½ inch sides and ⅝ inch or ¾ inch bottom, with timbers made of ¾ by 1-inch oak spaced 9 inches to centers, and a much lighter forward deck, the boat would show greater speed. I have found that two passengers make a tremendous difference, while one extra person does not cause a material change of speed. As for stability, I have had, including myself, five persons on board, all sitting on one side.

In a sea-way, this little craft behaves in a most remarkable manner. With Professor Malby on board I ran across the swell from Hendrick Hudson, about 50 feet astern of her without taking a drop of green water over the bow, and any one who has been out in the sea by that steamer will realize what this means.

Only with a high sea quartering to the stern is it necessary to use caution. With this kind of sea and with the boat running two feet to the sea's one she will coast at lightning speed down a wave and put her bow in nearly to the deck of the next sea ahead while the following sea is tending to throw the stern around.

As for cost, the following tables show the full amount of material used, exact cost of the entire boat, a table of weights and a list of tools necessary:

TOOLS NECESSARY

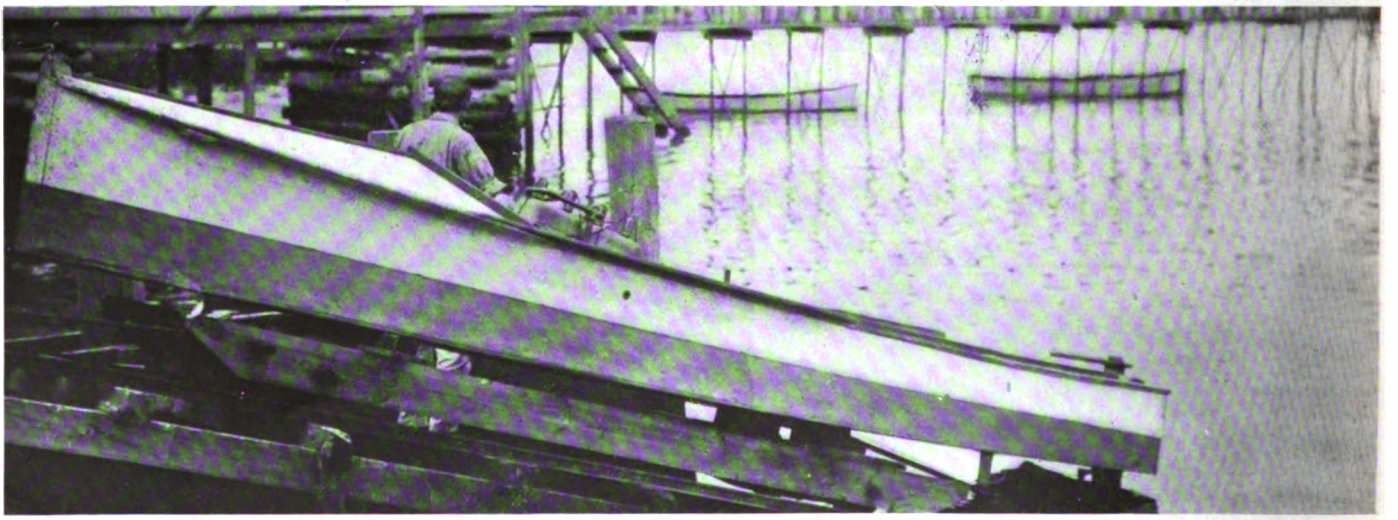
1 crosscut saw, fine	1 ½-inch wood chisel
1 crosscut saw, coarse	1 1-inch wood chisel
1 rip saw	1 1½-inch wood chisel
1 hammer	1 fore plane
1 ratchet brace	1 jack plane
1 ⅛-inch bit	1 smoothing plane
1 ¼-inch bit	1 spoke shave
1 ½-inch bit	1 try square
1 ¾-inch bit	1 2-ft. square
1 1-inch bit	1 nail set
1 1½-inch augur	1 mawl for riveting
4 8-inch clamps	2 2-inch paint brushes
1 8-inch monkey wrench	1 1-inch paint brush
1 14-inch monkey wrench	1 putty knife
1 8-inch stillson wrench	

Incidentally, since beginning the speed trials my weight has fallen from 195 lb to 175 lb, which may account slightly for the better speed we are now obtaining. I would strongly advise all those suffering from obesity to build a Viper.

TABLE OF APPROXIMATE WEIGHTS

	Pounds	
Engine	410	
Strut	12	
Shaft	40	
Propeller	15	
4 coils	6	
Vibrator	1	
Batteries	14	
Stuffing box	2	
Exhaust pipe	4	
Entire engine equipment...		504
Hull (approx.)	450	
Tank	20	
Gasolene	85	
Magneto	29	
Life-preservers	12	
Cover	10	
Rudder	15	
Operator	195	816
Total.....		1320

Name Material	No. Pieces	Size	Kind	Cost
Side planking	6	⅞ in. by 9 in. by 18 ft.	White cedar	$4.35
Bottom "	7	⅞ in. by 9 in. by 16 ft.	Red cedar	5.45
Keelsons	2	1¼ in. by 6 in. by 16 ft.	Cypress	1.20
Stern	1	1 in. by 17 in. by 36 in.	Cypress	.40
Frames	57	1 in. by 2 in. by 140 ft.	Oak	2.40
Spray boards	2	1 in. by 9 in. by 8 ft. 0 in.	Oak	1.20
Coaming or clamp	1	½ in. by 3 in. by 16 ft.	Oak	.60
Stern	1	4 in. by 6 in. by 30 in.	Oak	1.00
Chimes or Corner pieces	2	1⅛ in. by 1⅛ in. by 22 ft.	Oak	.96
Bed pieces	2	3 in. by 10 in. by 4 ft. 0 in.	Yellow pine	2.00
Shaft Log	1	4 in. by 6 in. by 3 ft. 0 in.	Yellow pine	.40
Nails	5 lbs.	—4 in.	Galvan'd wire	.35
Nails	20 lbs.	—2 in.	Galvan'd wire	1.40
Screws	1 gross	—1½ in.	Galvan'd iron	.45
Brass for rudder	1	12 in. by 14 in. by $\frac{3}{16}$ in.	Brass	1.69
Strut	1	12-lb.	Tobin bronze casting	4.80
Hanger bolts	8	⅛ in. by 6 in.	Brass	1.60
Rudder sockets	2		Brass	.20
Rudder bolt	1	⅛ in. by 18 in.	Brass	.30
Babbitt metal	1 Pound.			.60
Brass rivets	12		Brass	.12
Canvas Cover	1 No. 6 Canvas.			4.20
Raw Oil	2 Gallons.			1.20
White Lead	12 Pounds.			.80
Japan Doyer				.28
Calking cotton				.15
Mill work	Planing.			.40
				$39.10



Ready to Launch

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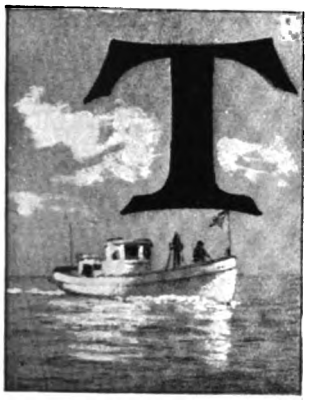
BERMUDA POWER-BOAT RACE



THE annual long-distance race to Bermuda this year found only two craft, Eronel II and Yo Ho, at the starting line, which lack of competitors, it is thought, was due, in part, to the fact that the Havana Race, finished just a short time before, took up the available time of some of the long-distance racing men who otherwise would probably have entered.

The two craft that did race were interesting in that one boat, Yo Ho, is a twin-screw boat propelled by two-stroke engines, both features being a novelty in this race, and although Yo Ho acquitted herself with credit she was unable to win over Eronel II, which craft was especially designed and built for the race by the same firm of designers who turned out the well-known Ailsa Craig, winner of the first and second power-boat race to the island.

The race this year, for the first time, was started up the Hudson River, off the clubhouse of the New York Motor Boat Club, instead of in Gravesend Bay in New York Harbor, and as the boats had to cover considerable distance before getting to sea their relative speeds were pretty well known before they laid their course for the islands, and it was evident that Yo Ho could hardly hope to be the winner unless something unforeseen happened.

On the day following the start, Eronel, while leading, was bothered with water in the gasolene and forced to lay to for several hours in the Gulf Stream. After they got going again she was pushed right through to the finish and beat Yo Ho to the mark by 4 hours and 30 minutes actual time, and 1 hour, 14 minutes, 28 seconds, corrected time.

SUMMARY

NEW YORK-BERMUDA LONG-DISTANCE RACE

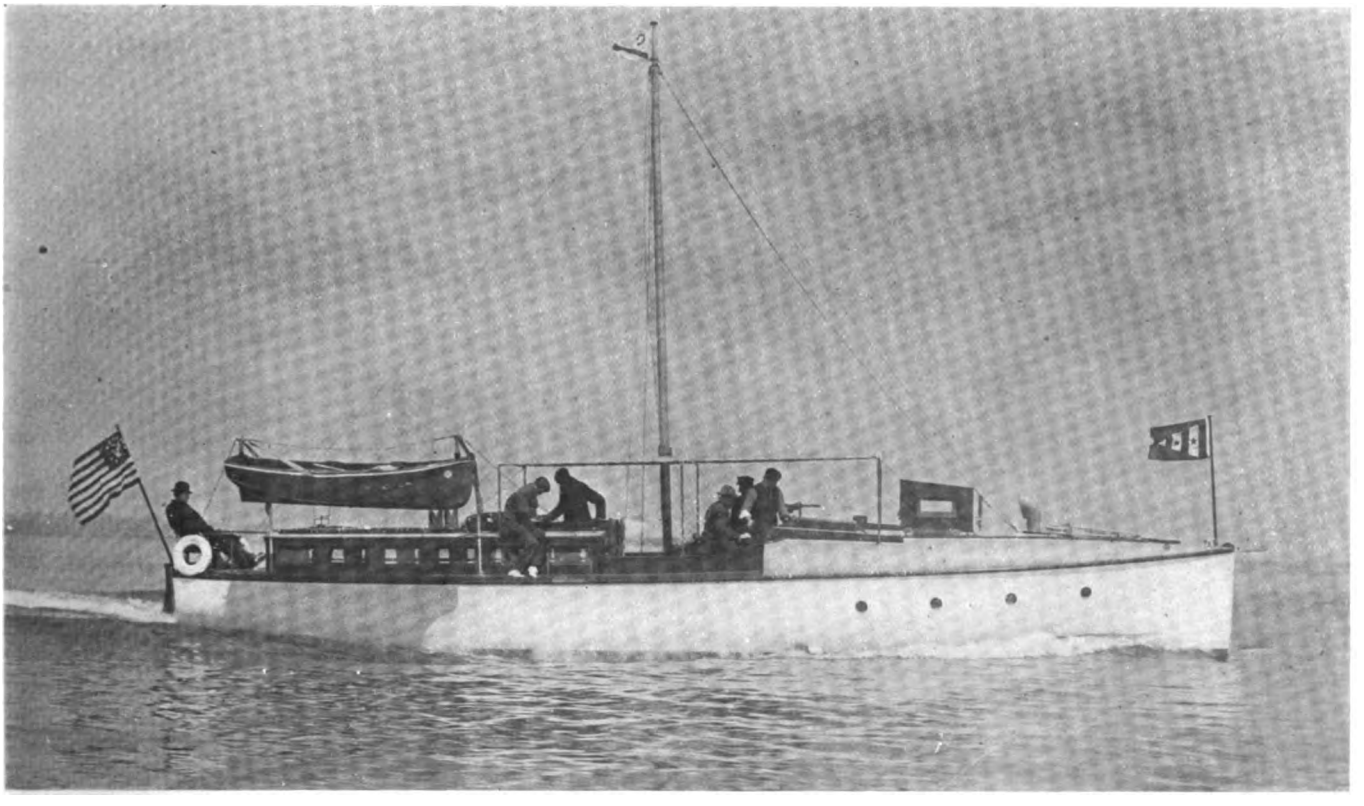
Start 10:15 A. M., June 25, 1910. Distance 670 Nautical Miles

Boat	Owner	Allowance H. M. S.	Finish H. M. June 29th	Elapsed Time H. M.	Corrected Time H. M. S.
Eronel II	S. Cochrane	———	2:20 A. M.	88:05	88:05:00
Yo Ho	F. P. Bacon	3:15:32	6:50 A. M.	92:35	89:19:28

Eronel II won by 1:14:28, corrected time.

STATISTICS OF THE CONTESTANTS

	ERONEL II	YO HO
Length over all	45.38 ft.	46.48 ft.
Length water-line	45.3 ft.	43.62 ft.
Area midship section	16.71 sq. ft.	19.42 sq. ft.
Engine	Craig	Bath
Type	1 four-stroke	2 two-stroke
Cylinders	4	2
Piston	6x7	5½x6¼
Screws	One	Two
Horse-power	37.68	38.34
Rating	44.46	42.30
Gasolene supply	550 gal.	470 gal.
Lubricant	35 gal.	48 gal.
Water	240 gal.	150 gal.



Eronel, Owned by Samuel Cochrane Bensonhurst Y. C. Winner of the Bermuda Race

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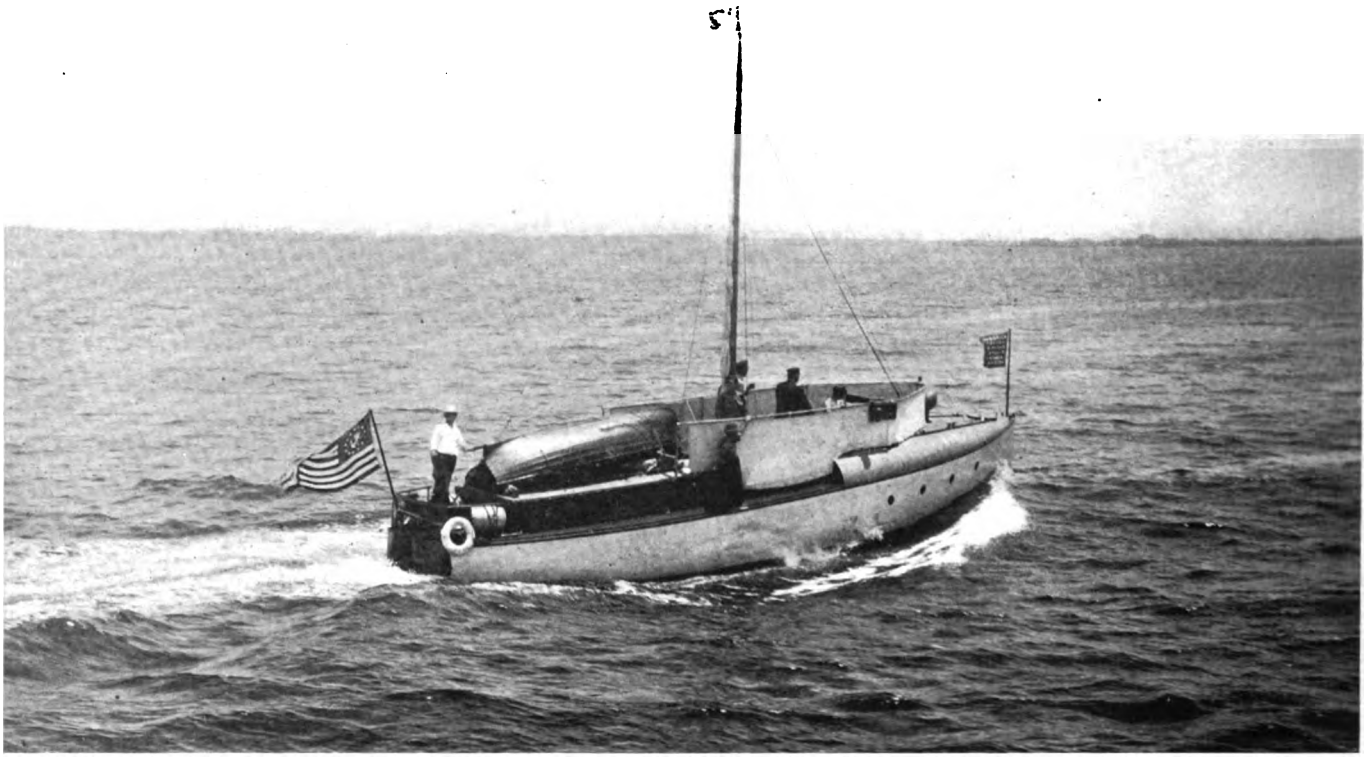
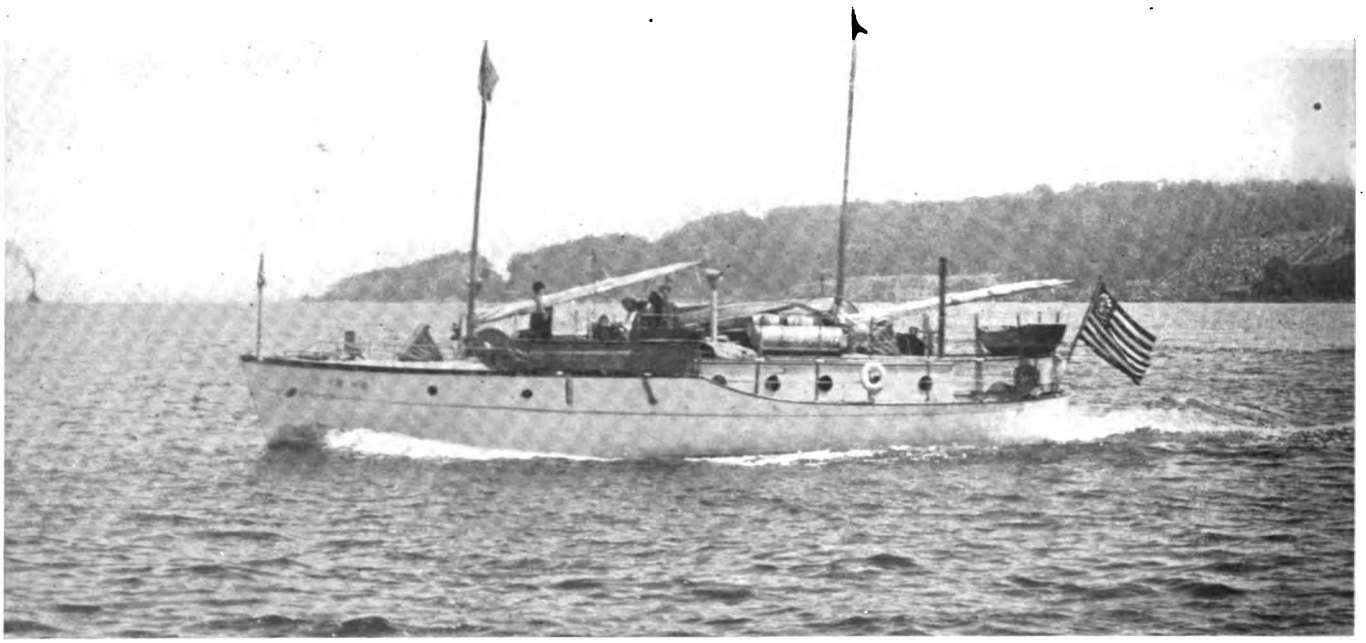


Eronel at Full Speed Passing Out to Sea



Yo Ho Crossed the Line First

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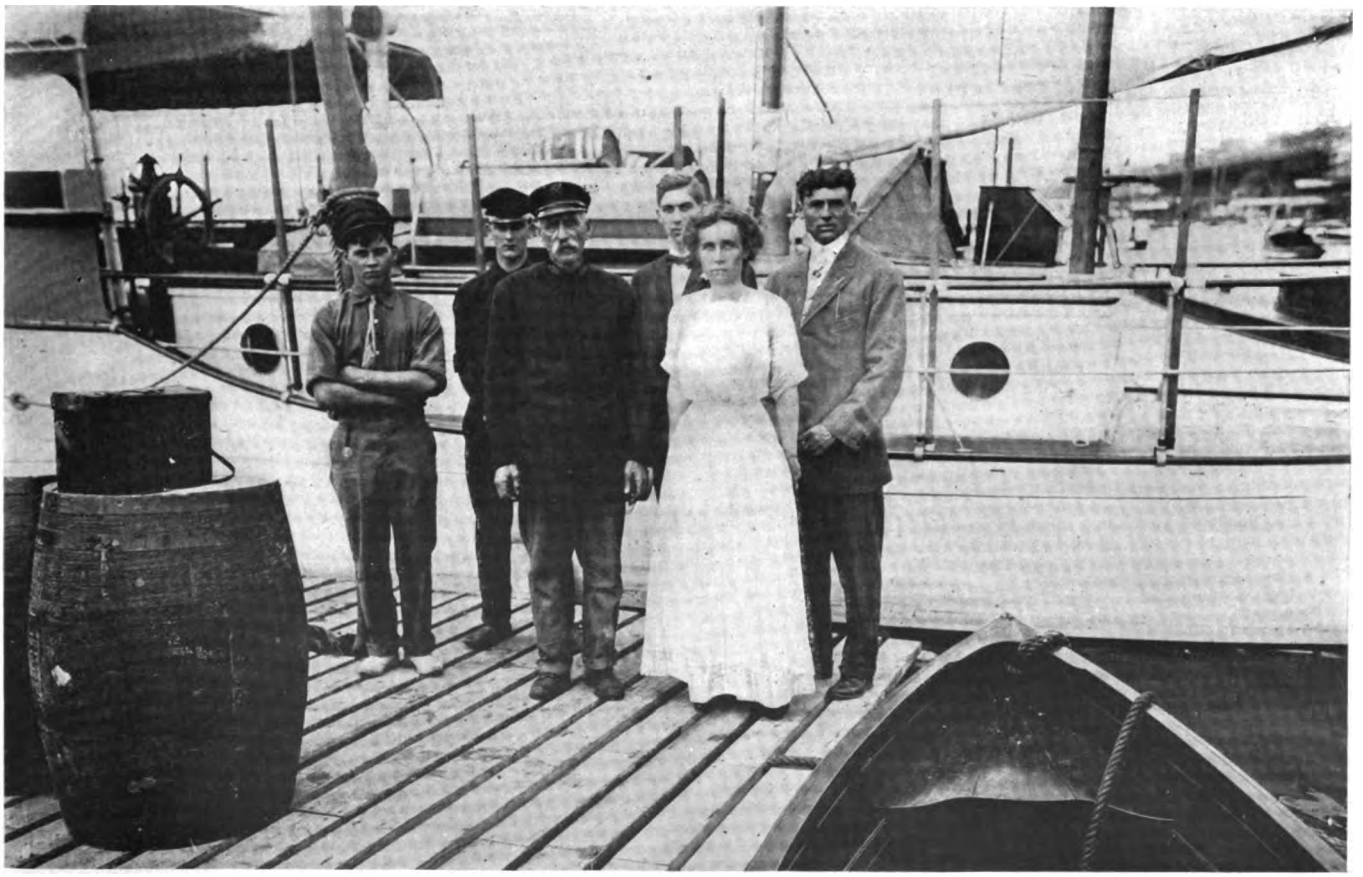
Crew of Fronel



Crew of Yo Ho

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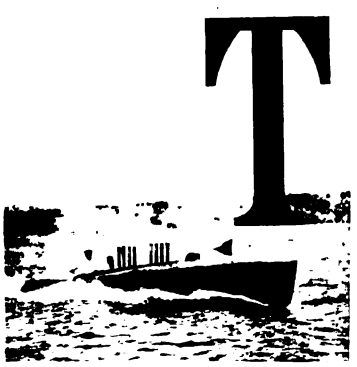
ANNUAL REGATTA OF THE MISSISSIPPI VALLEY POWER BOAT ASSOCIATION



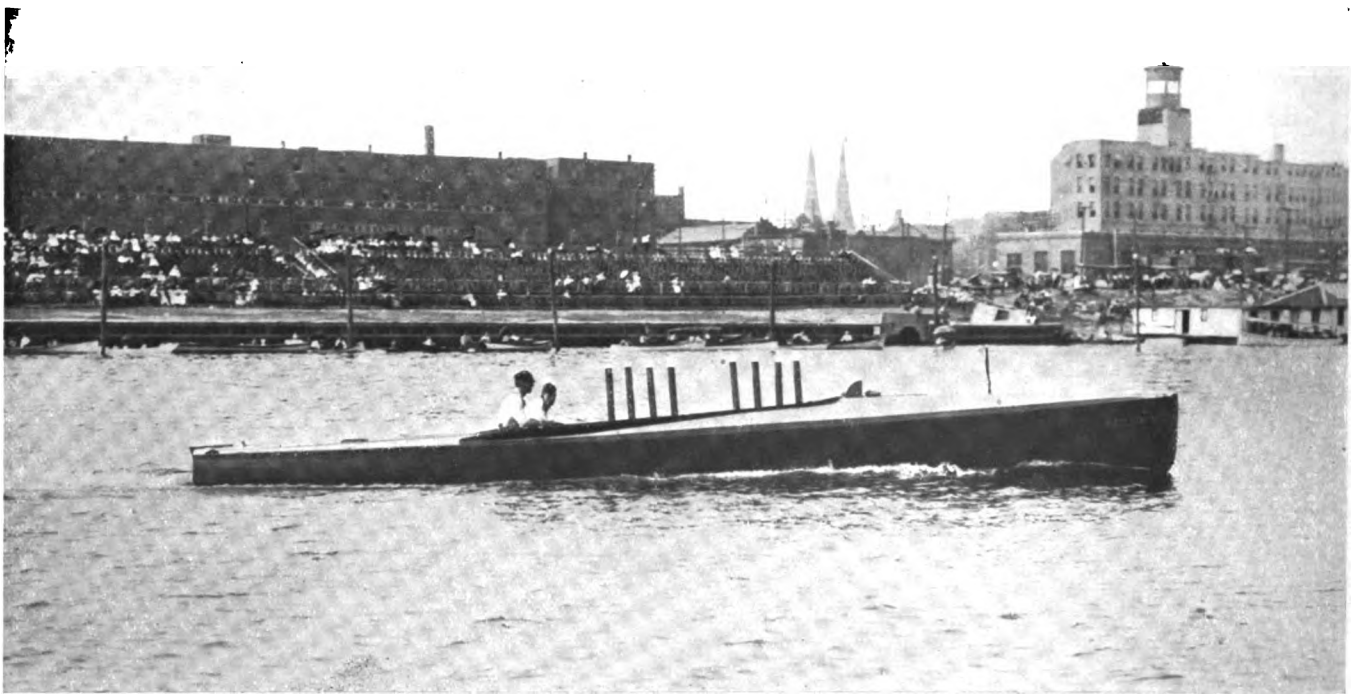
THE annual regatta of the Mississippi Valley Power Boat Association was this year held at Peoria under the auspices of the Illinois Valley Y. C. The regatta covered three days and provided enthusiasm for thousands of people. A feature of the affair being a mighty grand stand erected on the river front, which overflowed with a wildly enthusiastic crowd.

The course was a triangular one in the shape of an isosceles with the long leg by the grand stand, at the lower end of which was located the starting and finishing marks. As will be seen from the illustrations, some real speed craft participated in the three days' races, not the least interesting being Cero II, a steam-driven outfit 31 feet 5 inches long, which craft captured the mile speed trials, attaining an average speed of 32.9 statute miles per hour.

The first race of the meet took place on July 4th and was for open boats 30 feet and under. Rana won, with Argo second, and Josevila third. The second race, for 32-footers, brought out an interesting fleet of boats, among them the steamer, Cero II, which was awarded first prize; Beat It, the first boat in, being disqualified for failure to properly complete the course. In the afternoon the cabin cruisers were sent off on a 20-mile race, and but three of the five boats that started covered the course. Spark II proved to be the winner, with Allamakee II second. The last race of the day, for 20-footers, proved to be by far the most interesting of the lot. Eight of these little flyers came to the line and all but two finished. Comet proved to be the winner, with Scamp III second and Joker third.

A feature of the second day's racing was the win of Red Top II in the championship, free-for-all race at 20 miles. The New Hoosier Boy, second to finish, of which so much was expected, was not properly tuned up and Red Top walked off with the championship of the Mississippi Valley, and incidentally, a prize of $1,000 and a $1,000 cup, and another cup and another cup, all provided by local interests. Comet, a wonderful 20-footer, was the third boat to cover the course. Before the free-for-all the 26-footers had an inning at 10 miles, and Scamp III proved to be the winner, with Elbridge V second. The only other race of the day was a handicap race at 15 miles, which was won by Wux II, with Pronto II second and Pirate II third.

The first race on the last day of the meet was for half cabin cruisers, the course being 20 miles, and the



Red Top II, Champion of the Mississippi Valley, in Front of the Grand Stand at the Peoria Regatta
Photos by Hall

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race was easily won by Meteor, with La Tosca second. The second race was a 30-mile handicap affair for Classes C, D, E, and F, with the boats handicapped on the times made in the previous days' races. Pippin won, the places being captured by Pirate II and Wux II. The mile trials, of which much was expected in the way of speed, was won by the steamer, as stated above, with a speed of 32.9 statute miles per hour. Red Top, averaging 28.52 statute miles per hour, won second prize.

SUMMARY

ANNUAL REGATTA OF THE MISSISSIPPI VALLEY POWER BOAT ASSOCIATION

Peoria, Ill., July 4, 5, 7, 1910

FIRST DAY'S RACING

Class H, Open Launches. Start 2:01:30 p. m. Distance 5 Miles

Boat	Owner	Finish H. M. S.	Elapsed M. S.
Rana	W. F. Persons, Peoria	2:32:43	31:13
Argo	G. Hoffner, Peoria	2:32:47	31:17
Jose Vila	J. Muller, Jr., Peoria	2:37:03	35:33
Hindee	Baridan & Kenney, Peoria	2:37:52	36:22
Ivy Girl	Gower, G. & L., Peoria	2:41:34	40:04
Imp	J. W. Young, Peoria	2:41:36	40:06

Won by Rana, Argo second.

Class D, 32-foot. Start 2:51:00 p. m. Distance 15 Miles

Beat It	L. H. Mills, Chicago	3:23:38	32:38
Cero II	Robe Deming, Cleveland	3:26:17	37:17
Elbridge V	J. L. Seeley, Rochester	3:30:34	42:34
Teaser	J. A. Meritz, Quincy	3:36:09	45:09
Pirate II	Wm. Barnes, Peoria	3:36:34	45:34
Helen C	Wm. Rees, Peoria	3:40:00	49:00
Mascot	E. Corsepius, Ft. Madison	Did not Finish	
M. V.	Sinnig, St. Louis	Did not Finish	

Beat It disqualified for cutting course.
Won by Cero II, Elbridge V second.

Class A, Cabin Cruisers. Start 4:00:00 p. m. Distance 20 Miles

Sparks II	C. F. Sparks, Alton	5:41:35	1:41:35
Allamakee	W. S. Ferguson, St. Louis	5:42:50	1:42:50
Duro IV	A. Kron, St. Louis	6:01:30	2:01:30

Won by Sparks II, Allamakee second.

Class A, 20-foot. Start 5:50:50 p. m. Distance 10 Miles

Comet	Kelso & Helsinger, Bellevue	6:16:33	25:43
Scamp III	Paterson Bros., Davenport	6:17:16	26:26
Joker	C. L. Bohn, St. Louis	6:21:29	30:39
Pronto	Smith & Thede, Peoria	6:22:25	31:35
Judgey	J. Kelso, Bellevue	6:22:52	32:02
Wux	R. W. Ellis, Peoria	6:31:20	40:30
Pippin	E. H. Lenck, Muscatine	Did not Finish	
Elridge	Wm. Carrier, Peoria	Did not Finish	

Won by Comet, Scamp III second

SECOND DAY'S RACING

Class C, 26-foot. Start 2:18:40 p. m. Distance 10 Miles

Boat	Owner	Finish	Elapsed
Scamp III	Paterson Bros., Davenport	2:42:11	23:31
Elbridge V	J. L. Seeley, Rochester	2:43:39	24:59
Missouri II	H. Lippert, St. Louis	2:45:19	26:39
Vim	Meyers Bros., Peoria	2:45:32	26:52
Pronto II	Smith & Thede, Peoria	Did not Finish	
Mosquito II	C. M. Myers, Clinton	Did not Finish	

Won by Scamp III, Elbridge V second

Championship, 20 Miles, Free-for-All. Start 3:12:30 p. m.

Red Top	W. E. Hughey, Bellevue	3:56:10	43:40
Hoosier Boy	J. W. Whitlock, Rising Sun	3:59:46	47:16
Comet	Kelso & Hilsinger, Bellevue	4:00:28	47:58
Beat It	L. H. Mills, Chicago	4:04:32	52:02
Missouri II	H. Lippert, St. Louis	4:06:12	53:42
Oshkosh	Fred Athearn, Oshkosh	4:08:20	55:50
Vim	Meyer Bros., Peoria	4:11:08	58:38
Vim	Geo. Sherine, Dubuque	Did not Finish	
Cero II	Robert Deming, Cleveland	Did not Finish	

Won by Red Top, Hoosier Boy second.

Handicap I. V. Y. C. Distance 15 Miles. Starts on Handicap

Boat	Owner	Start	Finish	Elapsed
Wux II	R. W. Ellis, Peoria	4:35	5:29:02	54:02
Pronto II	Smith & Thede, Peoria	4:58	5:41:53	43:53
Pirate II	Wm. M. Barnes, Peoria	5:01	5:44:25	43:25
Helen C.	Wm. Rees, Peoria	4:58	5:44:50	46:50
Pronto	D. S. Brown, Peoria	4:35	5:45:34	1:10:34
Mora D	Wm. Turnbull, Peoria	4:35	5:49:10	1:14:10
Beat It	L. H. Mills, Chicago	5:10	Did not Finish	
Bon Jour	F. G. Buffe	4:45	Disqual	36:35
Vim	Geo. Therine, Dubuque	5:05	Did not Finish	

Won by Wux II, Pronto II second.

THIRD DAY'S RACING

Half Cabin Class. Start 2:05:33 p. m. Distance 20 Miles

Boat	Owner	Finish	Elapsed
Meteor	A. Kron, St. Louis	3:49:34	1:43:41
La Tosca	T. B. Sieisle, St. Louis	4:08:08	2:02:15
Alamo	Scribner & Stien, Clinton	4:10:04	2:04:51

Won by Meteor, La Tosca second.

Handicap Speed Class. Start on Handicaps. Distance 30 Miles

Boat	Owner	Start	Finish	Elapsed
Pippin	E. H. Lenck, Muscatine	2:00:00	4:25:00	2:25:00
Pirate	Wm. Barnes, Peoria	3:03:00	4:37:30	1:34:30
Wux	R. W. Ellis	2:42:30	4:51:00	2:08:30

Won by Pippin, Pirate second.

32-Foot Special. Start 5:01:00 p. m. Distance 15 Miles

Boat	Owner	Finish	Elapsed
Comet	Kelso & Hilsinger, Bellevue	5:36:53	35:53
Beat It	L. H. Mills, Chicago	5:42:21	41:21
Missouri II	H. Lippert, St. Louis	5:42:28	41:28
Vim	Meyer Bros., Peoria	5:44:22	43:22
Joker	C. R. Bohn, St. Louis	5:46:29	45:29
Pronto	Smith & Thede, Peoria	Did not Finish	

Won by Comet, Beat It second.

Cero II, the Steamer, Winner of the Mile Trials. Average Speed 32.9 Statute Miles per Hour

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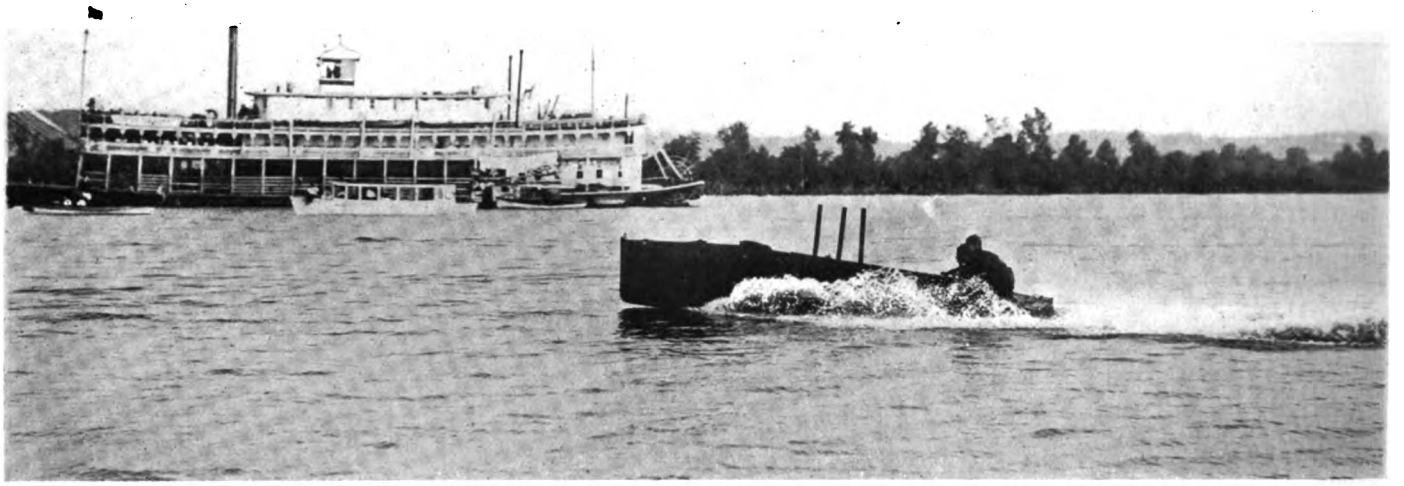
Elbridge V, Owned by J. L. Seeley, Rochester, N. Y.



Pirate II, Owned by Wm. M. Barnes, Peoria, Ill.

Photos by Hall

A Close Finish Between Vim and Missouri II

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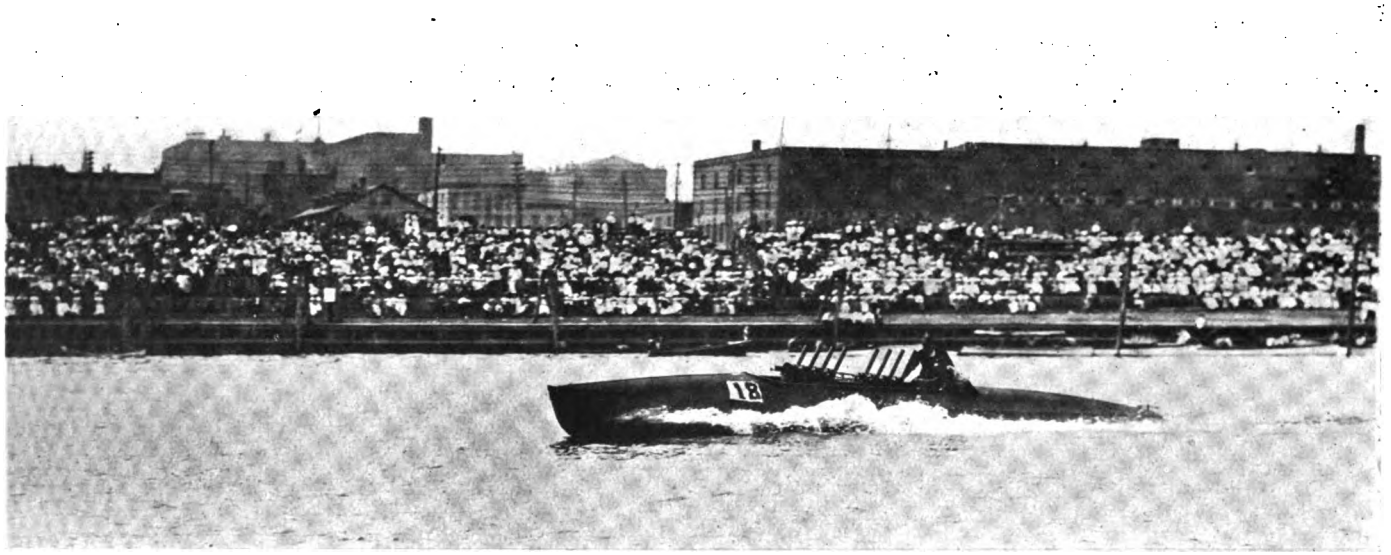
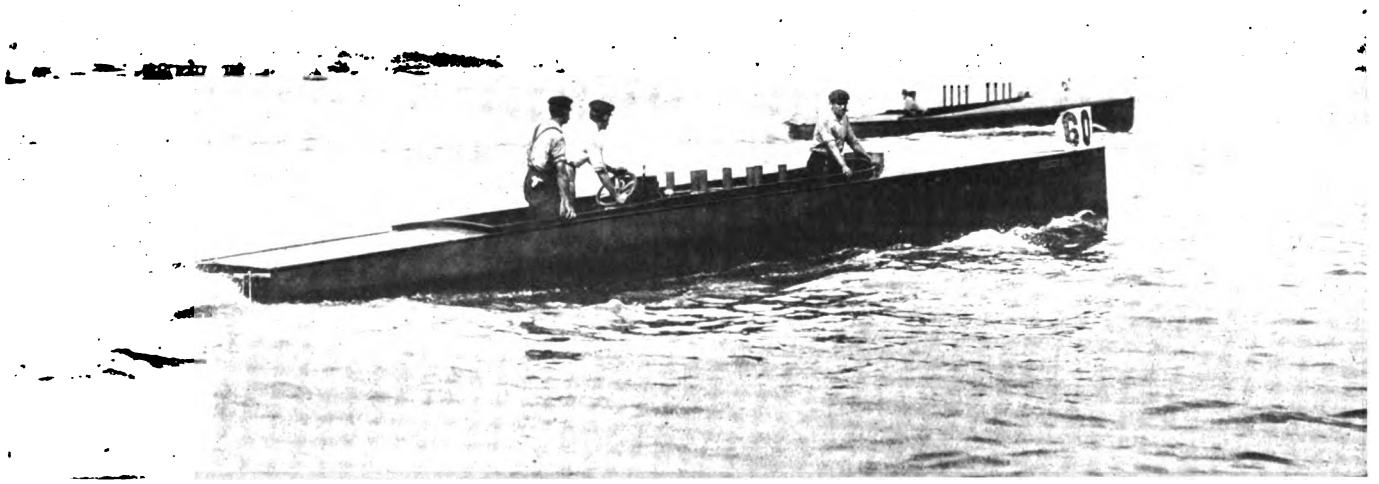


OshKosh Owned by Fred Athearn, OshKosh Wis.



Hoosier Boy Owned by J. W. Whitlock, Rising Sun, Ind.

Cero II, Owned by Robert Deming, Cleveland Ohio

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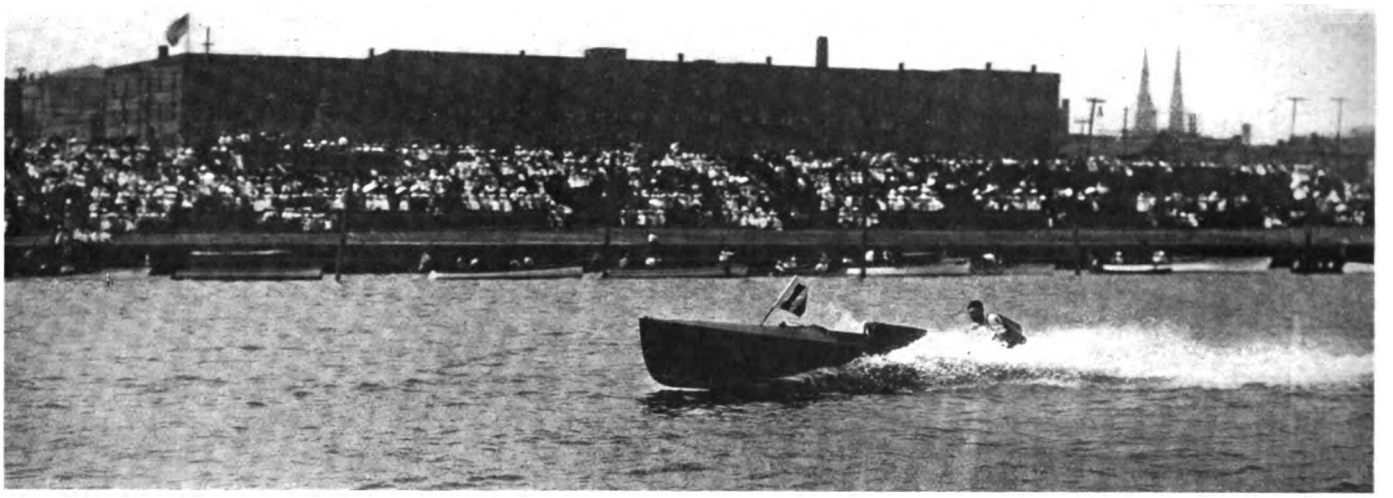
Mascot, Owned by E. Corsepius Ft. Madison, Iowa



Missouri II, Owned by H. Lippert, St. Louis Mo

M. V. II, Owned by —— Sinnig, St Louis, Mo

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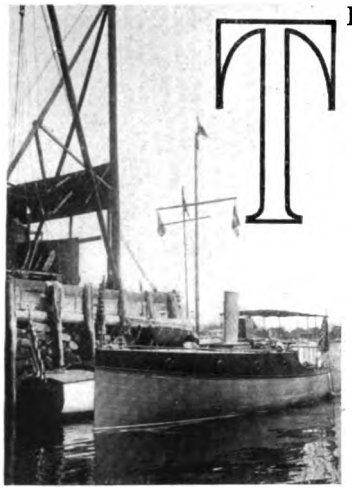
THE MARBLEHEAD RACE



THE Marblehead Race this year brought out but four starters. Blue Peter V, a high-speed 40-footer with a 50-60-h.p. Holmes engine, which craft covered the course in record time and according to present calculations proved to be the winner (however, some of the ratings were protested and at present writing the final decision has not yet been rendered); Elmo II, a 33-footer with a 12-h.p. Standard engine, winner of last year's race and many other long-distance events; Aldebaran, and Oeyesee, which craft met with a slight mishap and put in at Provincetown for repairs.

Blue Peter V was designed by Henry J. Gielow and built by the Holmes Motor Company for R. C. Seymour, of Larchmont. She covered the course of 285 nautical miles in 27 hours, 34 minutes, 45 seconds, which is a record for the course.

Josephine, winner of the fast time prize last year, made the run from Bay Ridge to Marblehead under almost perfect conditions in 31 hours, 56 minutes, 45 seconds, just 4 hours and 22 minutes longer than taken by Blue Peter.

The boats were started from Marblehead at 10:05 a. m., on Saturday, July 16th, and with the exception of a few sharp squalls off Cape Cod had a fairly smooth trip.

BLUE PETER'S RUN

WITH several other members of the crew I joined Blue Peter only fifteen minutes before the start of the race. We left New York Friday evening on Commonwealth, reached Boston at 7:15 and planned to catch the 8:18 out for Marblehead. A bridge had burned down and the train was delayed in starting, and as it had to go in a roundabout route we were very late and had visions of missing the race. We took a seagoing hack at the station and rushed to the harbor, where Blue Peter V lay awaiting us. We got right underway for the yacht club where Elmo II, Aldebaran, and Oeyesee were, and after exchanging greetings with friends on the other boats started for the line.

Blue Peter V took the lead soon after the starting signal, and set an approximate course for the Cape, as the compass had not been adjusted. Several adjusters had been sent for at various places but all had failed to show up, so we set up a square compass on the stern and a small 2-inch compass was fastened on the mast as far

Blue Peter V, Winner of Fast Time Prize in Marblehead Race, Establishing a Record for the Course

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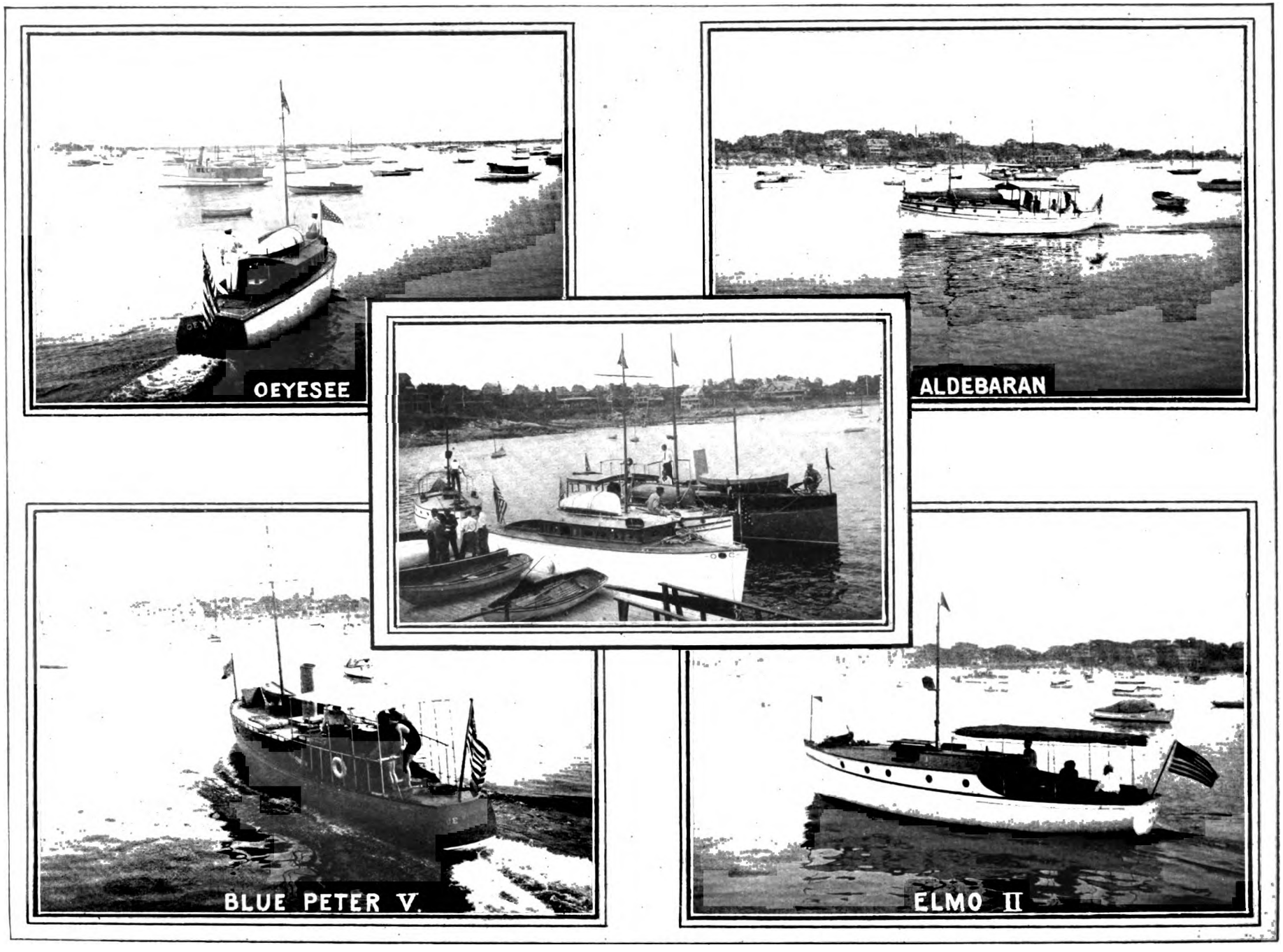

Photos by Lebick

Marblehead Race Contestants

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up as we could comfortably see by standing on the dinghy which was lashed on deck. We found our course was too far to the South'ard by comparing the one we were steering with that of Elmo II.

The stern compass was used as a master compass throughout the race, and the one on the mast was taken down, as it proved to be unreliable owing to the vibration.

The boats astern were soon lost in the haze, although they could see us, we found out later, an hour longer than we could see them. The water tower on the Cape was made out first and holding our course brought us in abreast of the Cape at Highland Light. We kept close to the beach, occasionally sighting some people along the shore who would wave to us. One life-saving station dipped the flag. The trip along this wonderful Cape is always interesting and one never tires of watching the hummock take different shapes. The wind was light, from the Northeast at the start, but increased so that steering became a little difficult. We kept out of the shoals at Chatham passing close to several catboats, and passed a submarine in tow.

From Chatham we laid a course to the black can buoy off Monomoy. We could easily see the shoal spots by the breaking water, as it was still daylight. After passing the red buoy off Monomoy Point we headed E. ½ N. for Hedge Fence Lightship. The tide was fair over the shoals and the wind fresh from the Northeast. In the short sharp sea we yawed quite badly. The weather was threatening and we were keeping cross bearings on our position in case it should shut in thick. All the lights were plainly visible and good time was made, as we carried a fair tide from Chatham all the way to Block Island.

After passing Hedge Fence Lightship we headed for Nobska Light to clear the shoal and then headed for a course to clear Gay Head and the rocks off the Point. A number of squalls would shut out the lights and we were hoping that they would clear off the weather.

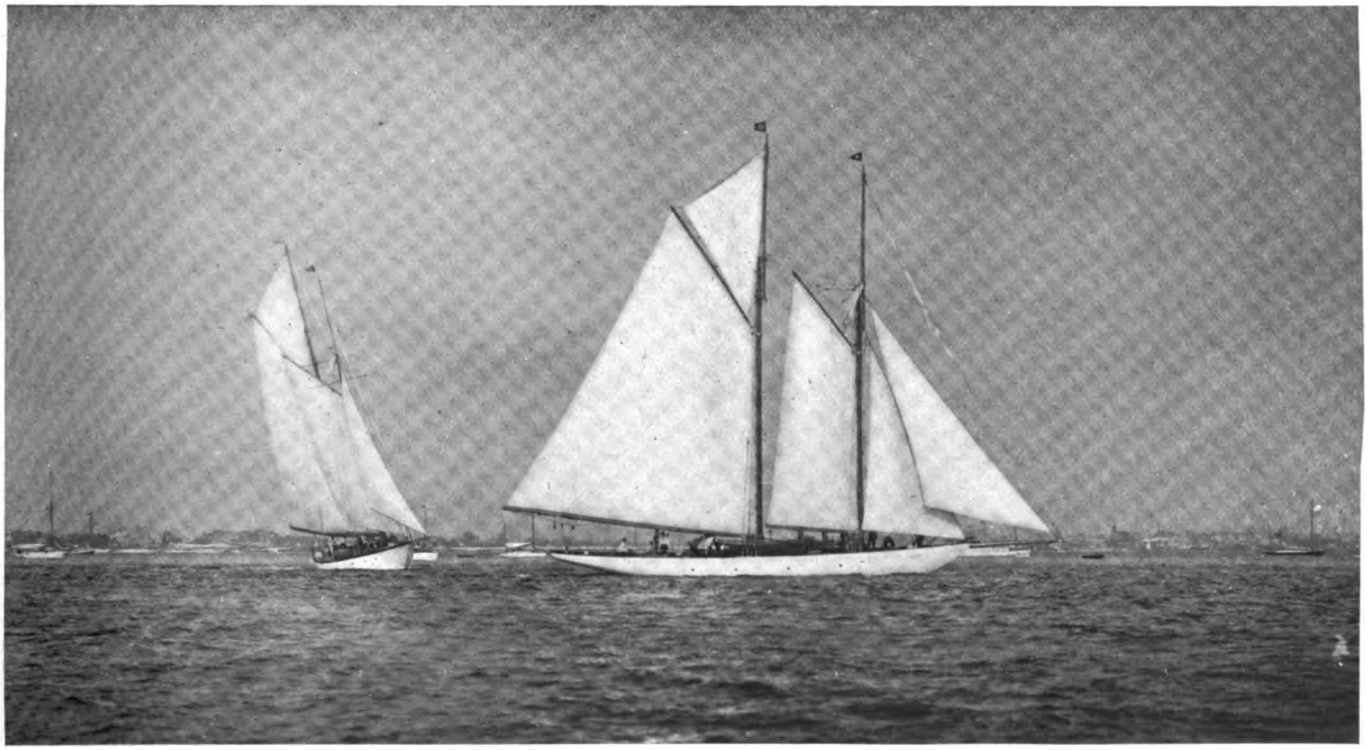
The engine was running like a clock so far, and as the designer and maker of the engine was aboard with his chief engineer we sailboat men thought there was no use worrying. The engine was fed some oil put into a brass thing, and they would pump on a bicycle pump to fill from one gasolene tank to another, and that is all they had to do. Every hour or two the engineer would feel the top of the engine in different places and manipulate a squirt pump into the engine somewhere. Most of the crew were sail-boaters and gave the engine a wide berth when passing it to go forward.

Block Island was abeam at about midnight, and having seen a great many lobster pot buoys off there two weeks previous kept fairly well to the South'ard as the chief engineer said it would be all up with us if one of the pots got mixed up in the wheel. The wind was E.S.E. between Gay Head and Montauk and blowing a good breeze. It kicked up quite a sea for a power boat and we would frequently get on top of a wave and slide down at great speed, making steering quite lively. Montauk was soon seen ahead and about this time the wind died out and the sea calmed down considerably.

The run along the Long Island beach was uneventful except that off Shinnecock we were supposedly headed for a line of ducks, and awoke to the fact that we were about to pile into a floating fish net when only 50 feet away. By swinging the wheel, which is flat like a freight car brake wheel, we missed the nets by two feet. After this one of the crew sat forward.

Off Fire Island we saw a steamer ashore and apparently she had gone on the beach some time before, as her bow was gone. Soon after this we passed a full-rigged ship bound West and it was a magnificent sight. She, the old-timer, and we, on the up-to-date.

Clearing the shoals off Rockaway we came up the



Start of Bermuda Race. Only Two Boats Started, Vagrant and Shiyessa, the Former Winning by 48 Minutes Corrected Time

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harbor with a fair tide and finished off the Crescent Athletic Club house at Bay Ridge at 1:39:45 p. m., having made the run from Marblehead in 27 hours, 34 minutes, 45 seconds, a record for the course.

GEO. W. ROBINSON.

BROOKLYN CHALLENGE CUP RACE

THE Brooklyn Y. C. Challenge Cup Race this year was held under rather unfortunate conditions; the first part of the course being run in a dense fog which delayed the boats considerably.

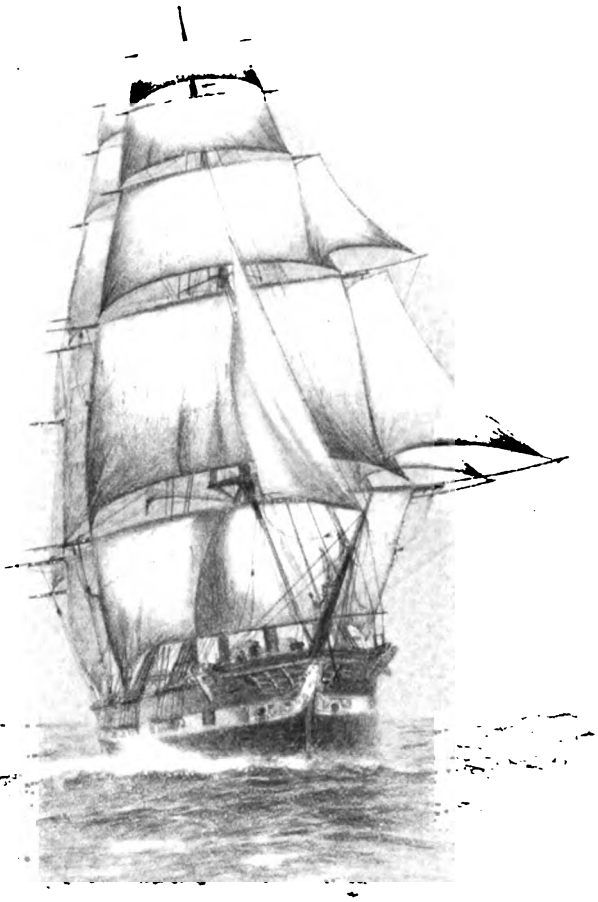
Five clubs were represented. Victory, of the New York Athletic Club, winner of the trophy last year; Amorita, of the Harlem Y. C.; Rowdy, of the American Y. C.; Helena, of the Mariners Harbor Y. C., and Waialua, of the New Rochelle Y. C., owned by H. L. Stone, which craft proved to be the winner.

The boats started at 10:45 on July 2d, and Waialua covered the 280 miles in 40 hours, 25 minutes, 12 seconds, beating Rowdy by nearly four hours on corrected time. The course was the same as last year, from Huckleberry Island down the length of Long Island Sound to and around Vineyard Sound Lightship, thence around Long Island to the Brooklyn Y. C. on Gravesend Bay, New York Harbor.

CAPE MAY RACES

THE annual race of the Brooklyn Y. C. from Gravesend Bay to and around Northeast End Lightship off Cape May, thence around Fire Island Lightship to the club anchorage, brought out only three starters; two sloops, Adyta II and Gardenia, and the schooner Tammany. Gardenia made a runaway of the race, with Adyta II second, and Tammany last.

The club also had a power-boat race over the same course, which was called off on account of lack of entries. It was rather unfortunate that this race should have proven such a fizzle, as the course is an easy one and should provide some interesting racing.



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THE RUBBER

SEPTEMBER 1910

VOL. XXIV

No. 3

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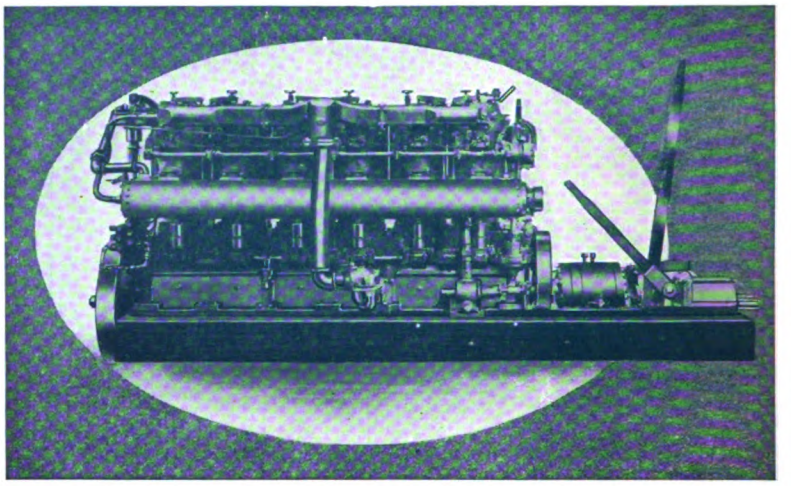

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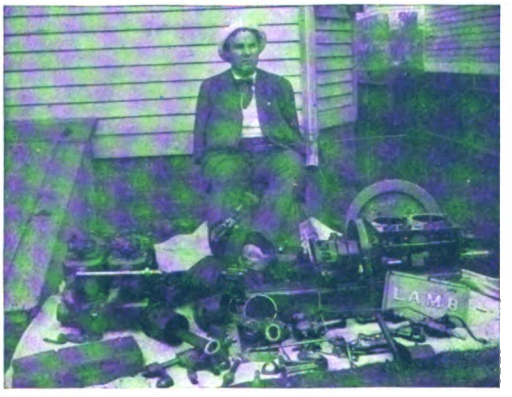

ACCESSIBILITY

The illustration shows Mr. Lutz, a Lamb engine enthusiast, who has recently made a 2,000-mile trip with a 12-H.P. Lamb engine, and being unfortunate in not having hands or arms was able to take down his Lamb engine without aid owing to its accessibility.

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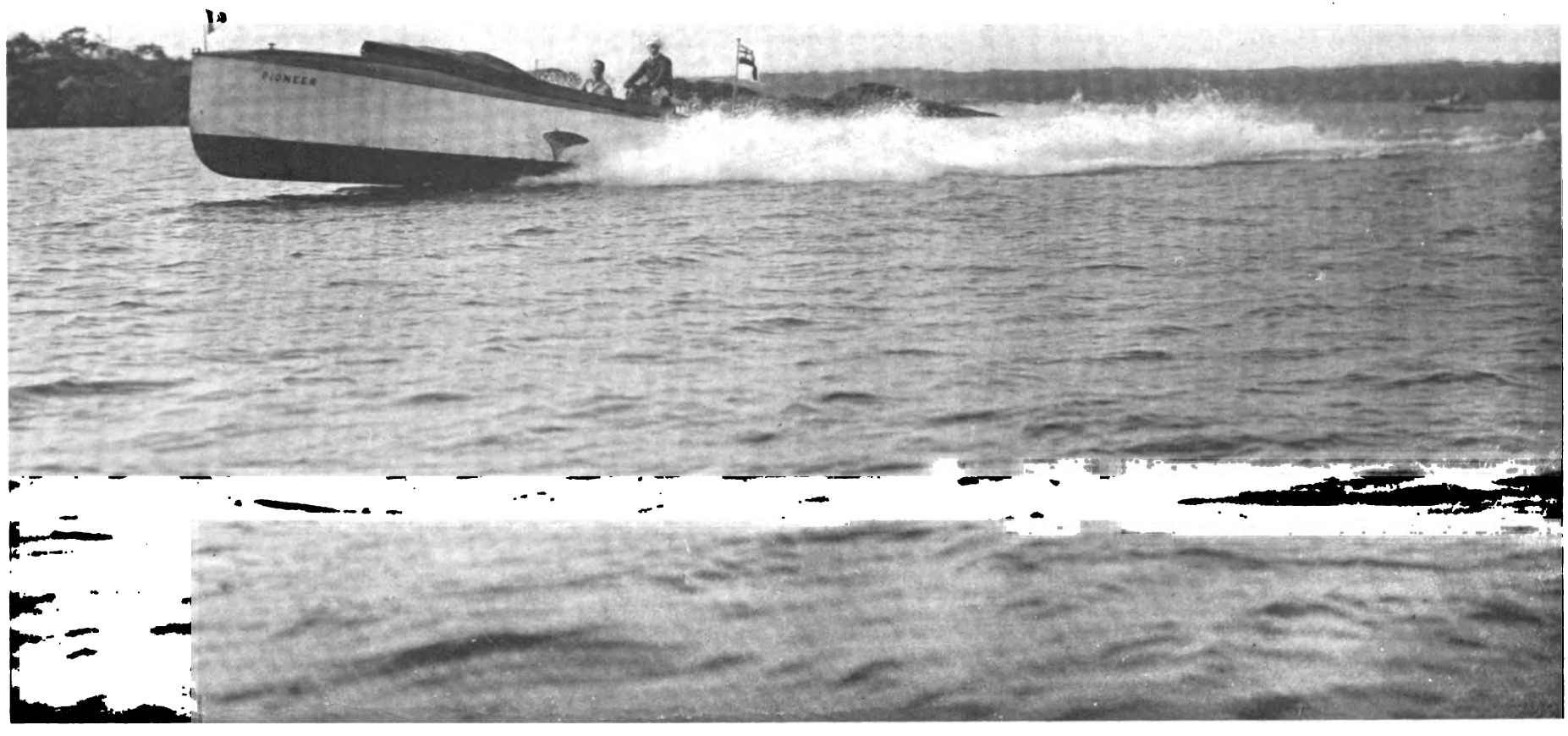

Owned by the Duke of Westminster **Pioneer** *40 Ft. O. A., 12-Cylinder, 400-H.P. Wolseley-Siddeley Engine*

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The Rudder

Edited by THOMAS FLEMING DAY

Vol. XXIV SEPTEMBER, 1910 No. 3

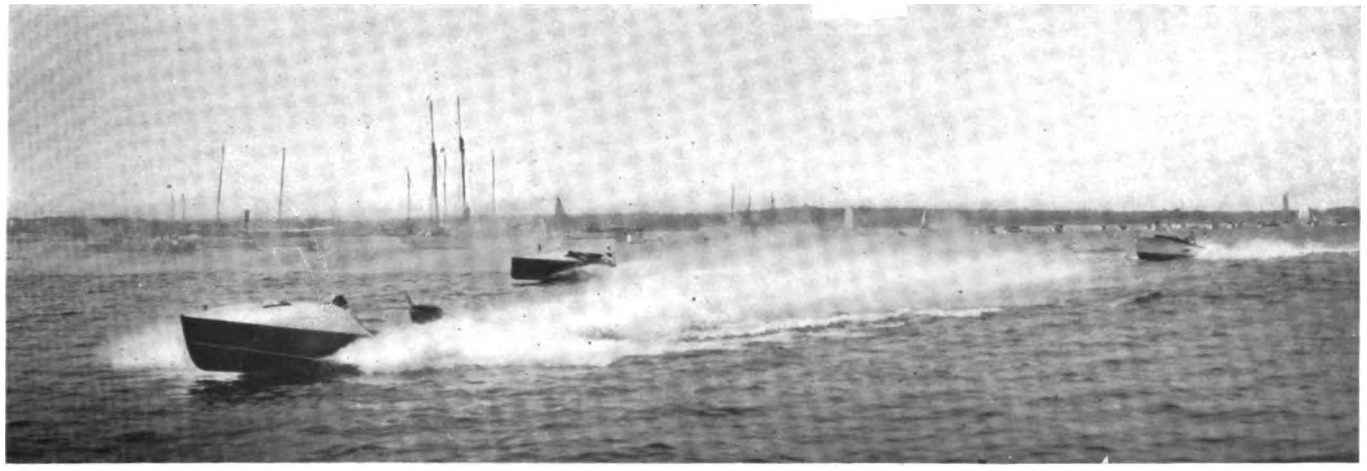
INTERNATIONAL CUP RACE

Walter M. Bieling

AGAIN the British International Trophy was successfully defended by the American boats, but owing to the fact that two of the British boats broke down and one failed to start the victory was a hollow one, especially since one of the British boats was so very much faster than the best American that the spectacle was sad to see through American eyes. Dixie III with the engine of Dixie II, which machine defended the trophy at Huntington two years ago ran in her usual consistent way and proved to be the winner, for which the craft should receive all the credit due her; but there is no gainsaying the fact that Dixie has met her master at last and that Pioneer, the Fauber-Saunder's hydroplane, is miles faster.

The course this year was laid in the open Sound off Larchmont and theoretically was run by the Motor Boat Club of America, but through its affiliation with the Automobile Club and this organization in turn with the Larchmont Y. C., the identity of the former club was completely lost; but it certainly was a sad spectacle to see the Larchmont Club, with its record of hundreds of races, sharing its prestige with a social organization and a picayune motor boat club whose sole excuse for existence is the fact that years ago one of its commodores had the necessary sporting blood to go over to England and bring back the Harmsworth Cup, now known as the British International Trophy.

About a half-dozen boats were built this year for the defense of the trophy, but of the entire lot not a single one made good to the extent of getting into the finals and covering one round of the course, and had it not been for Dixie III, now in her second season and her engine in her third season, the trophy would now be on its way back home. The team of three finally chosen, for the simple reason that there were only three boats on the scene, were Dixie III, Restless and Nameless.



Start of the Race for the British International Trophy off Larchmont, N. Y.

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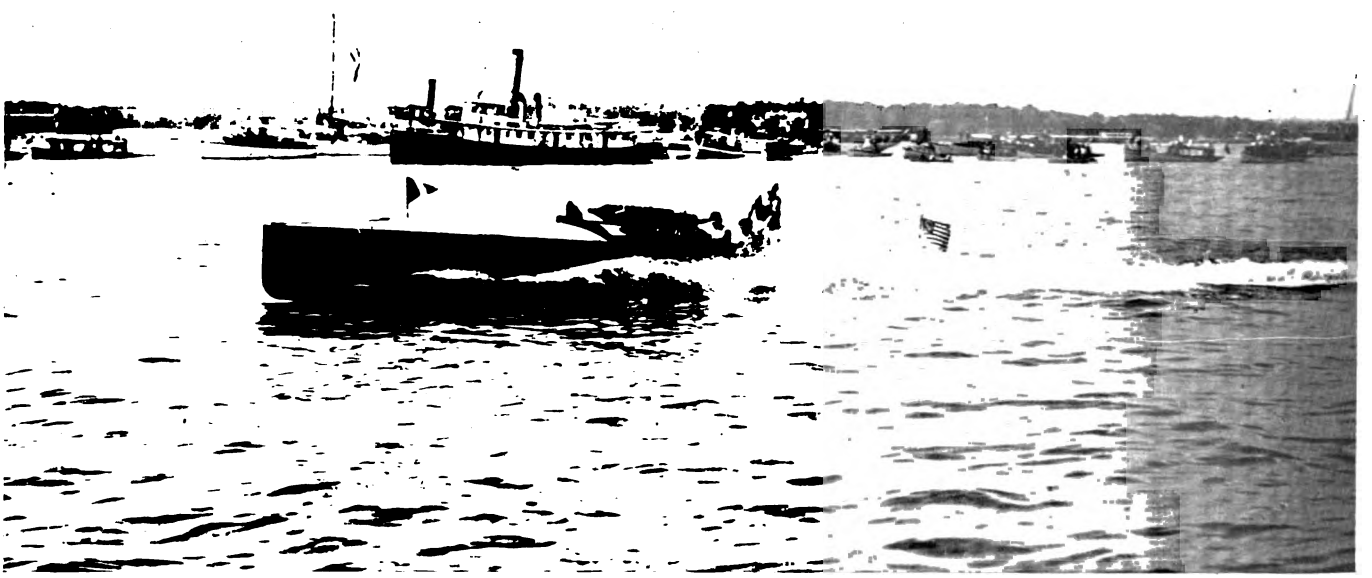
The former craft has been described many, many times; and of the normal type of hull she is as good as any afloat for her length. Restless was designed and built by the Atkin-Wheeler Company, and engined by Herreshoff, a nephew of the talented designer of the same name. She had two four-cylinder engines of the V type driving twin screws. She was on the scene at the start but did not get going in the race. Nameless was built and engined by the same combination, with four engines and four screws, and started but did not complete one round, leaving Dixie alone to carry on the hopes of America.

The race was scheduled to start at 2:30 p. m. on Saturday, August 20th, and at the appointed time everything seemed to be in readiness, but for some reason or other the combination committee ordered a postponement of one hour, which apparently was entirely unnecessary and which action annoyed the English helmsmen beyond measure. The same thing happened last time and it is to be hoped that if we ever have a race again the performance will not be repeated. Men who handle these high-speed boats are at considerable tension and in an event of the importance of this contest the vagaries of a regatta committee should not in any way detract from the interest of the affair or the efficiency of the crews, unnecessarily.

The preliminary gun was finally fired at 3:25 p. m. and at 3:30 the boats were sent away on their journey. Zigorella was away first about ten seconds after the gun, Dixie about three seconds later, and Pioneer next about not more than a second or two behind, with Nameless 14 seconds after Pioneer. Restless, the other member of the American team, did not start, and Maple Leaf II of the British team, the challenger, lay at her moorings out of commission with a broken back, the hull, it was reported, not being strong enough to support the weight of the engines.

As the boats shot over the line it was apparent almost instantly, even to the most unnautical spectator, that Dixie had met her match, for Pioneer simply sailed through the fleet as if they were stuck in the mud. The distance from the start to the first mark is exactly 2 1/16 miles and the distance around the turn a half-mile. As Dixie struck the first buoy Pioneer had straightened out for the run down the Sound on the last buoy of the first turn, showing that in a distance of 2 9/16 miles she had distanced Dixie exactly one-half mile, which caused the slide rule experts present, who had taken the trouble to time the boats, to fairly gasp with astonishment. At this point Dixie was leading Zigorella about a quarter of a mile with Nameless just holding her own with the last-named boat. It was now obvious that the race was between Pioneer and Dixie with a question as to how much Dixie would be beaten, barring accidents. The excitement had hardly subsided when Pioneer was sighted coming along the home stretch for the first turn with Dixie a speck in the distance. Pioneer appeared to be going strongly and drove along in beautiful style, but as she came abreast of Scotch Caps about 1¾ miles from the home mark, she slowed down, and when abreast of the buoy to the westward of this point, about 1½ miles from the finish she stopped dead. The writer happened to be in a patrol boat at this point and upon going over discovered the craft on fire in the region of the carbureter. She was blazing right merrily and it looked as if the greatest 40-footer to date was about to lay a course to Davy Jones. The engineers and helmsmen sadly viewed the blaze but did not in any way lose their nerve. Fortunately a steam yacht in the vicinity sent over a large fire extinguisher and the fire was squelched. Under the conditions most racing men would have retired, but not so with this crew. Hardly was the blaze out before they started to work like Trojans to get her going again, and a mighty cheer went up 15 minutes and 2 seconds later when the boat again got underway and dashed after the flying Dixie in a hopeless stern chase. For one circuit she tore around in good time, doing the 10 miles in 17 minutes 31 seconds or at the rate of 39.43 statute miles an hour; however, the fire had spoiled her chances and she was unable to sustain this speed for



Photos by Levick **Dixie III Going by Committee Boat on First Round**

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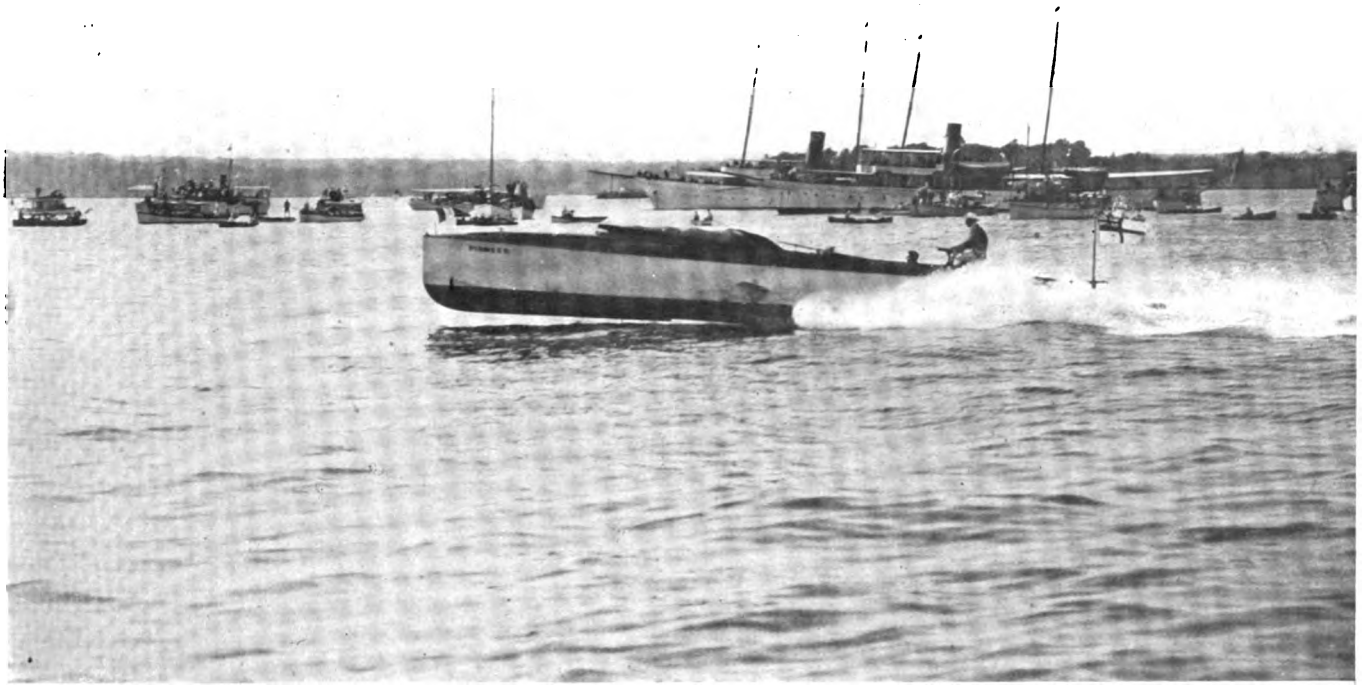
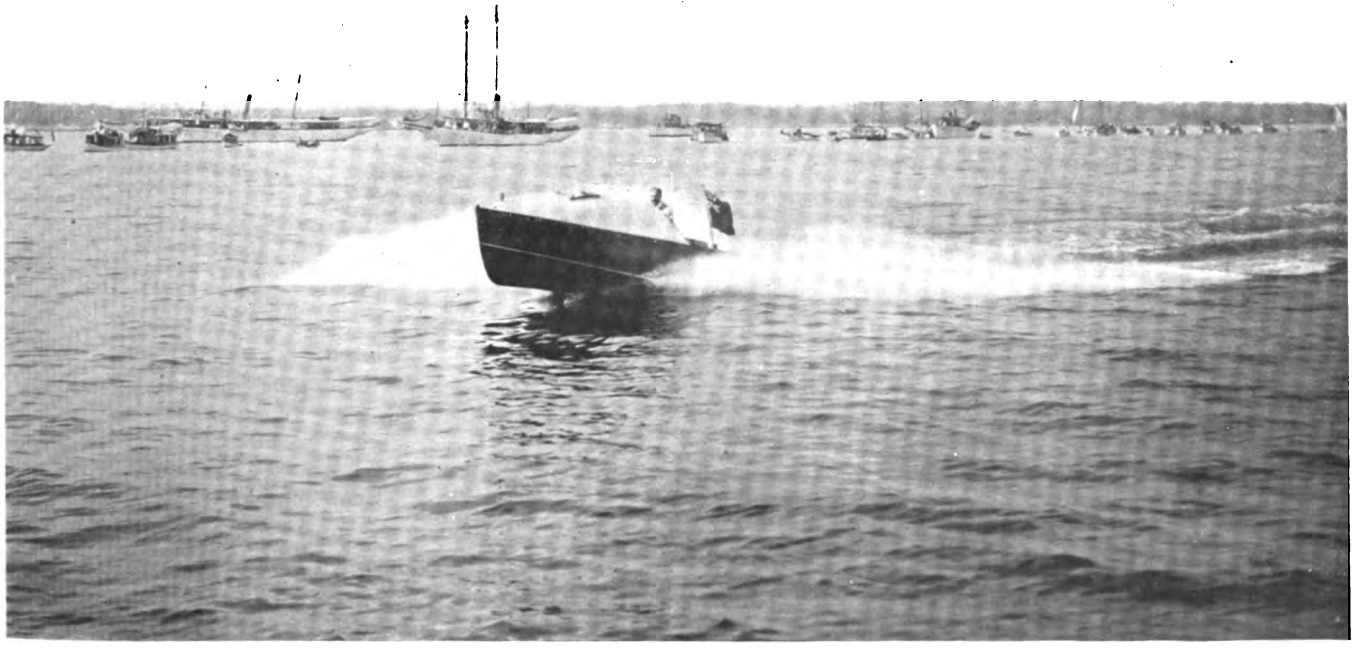


Pioneer Just After Dropping the Other Contestants at the Start



Zigorella Was First Over the Line

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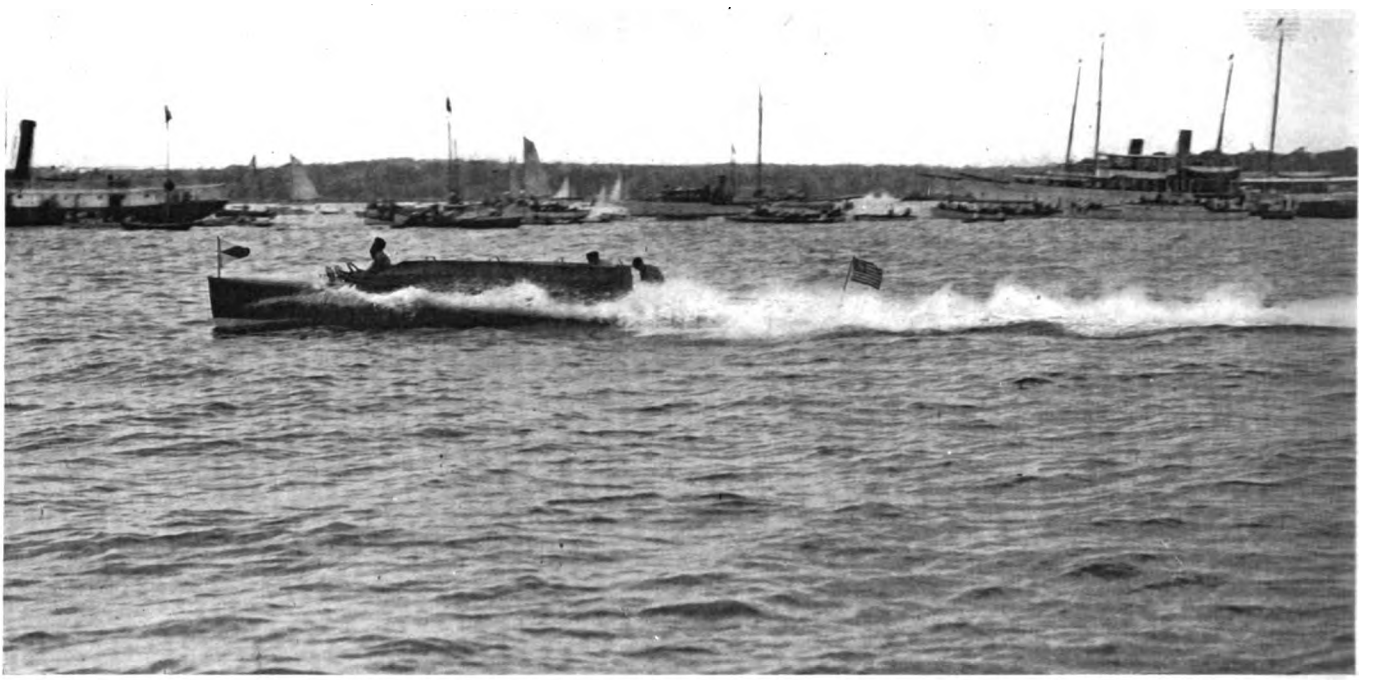
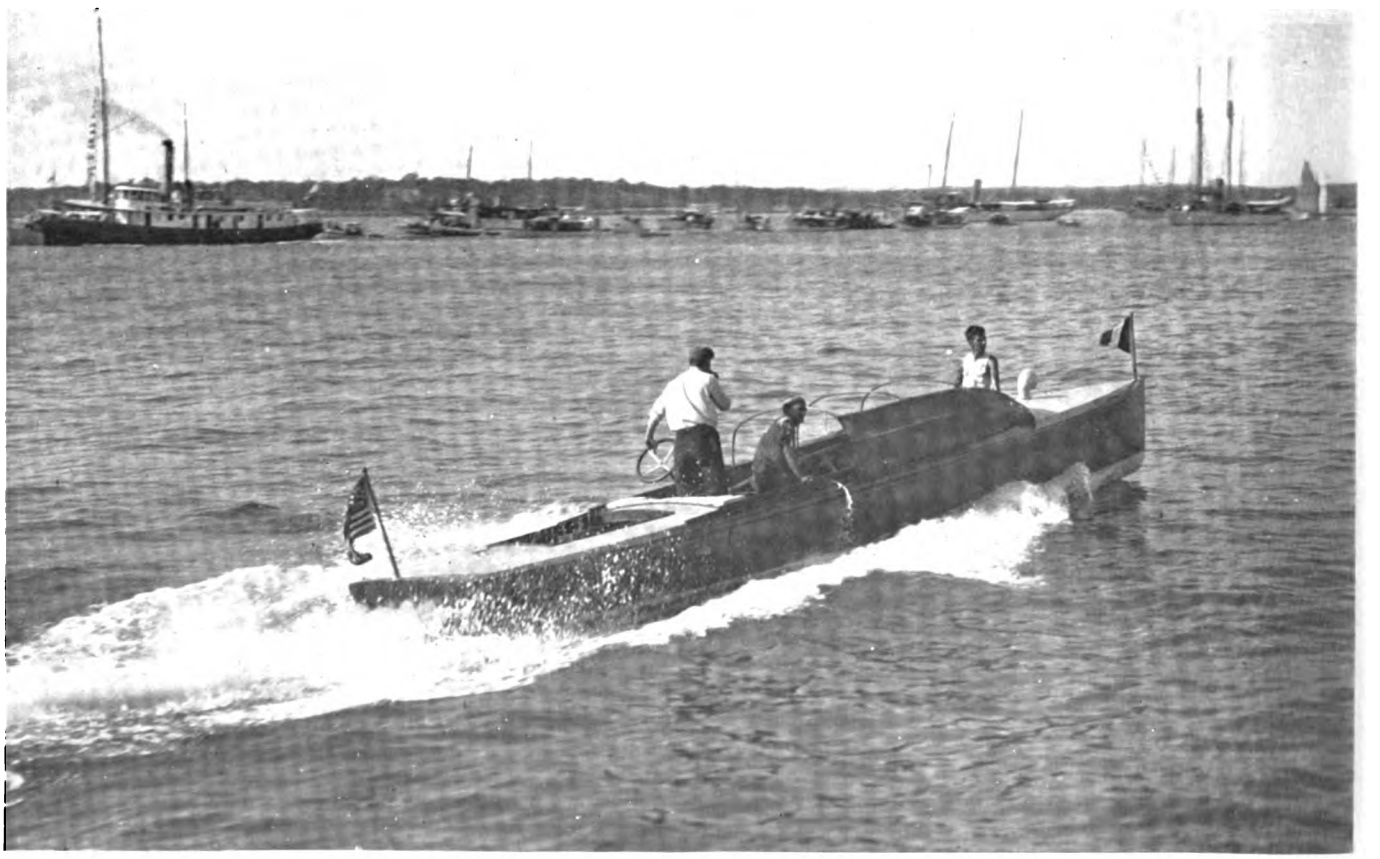


Nameless Was a Little Late for the Start but Got Off Well



Restless Did not Get Off with the Gun but Went Up the Course Later

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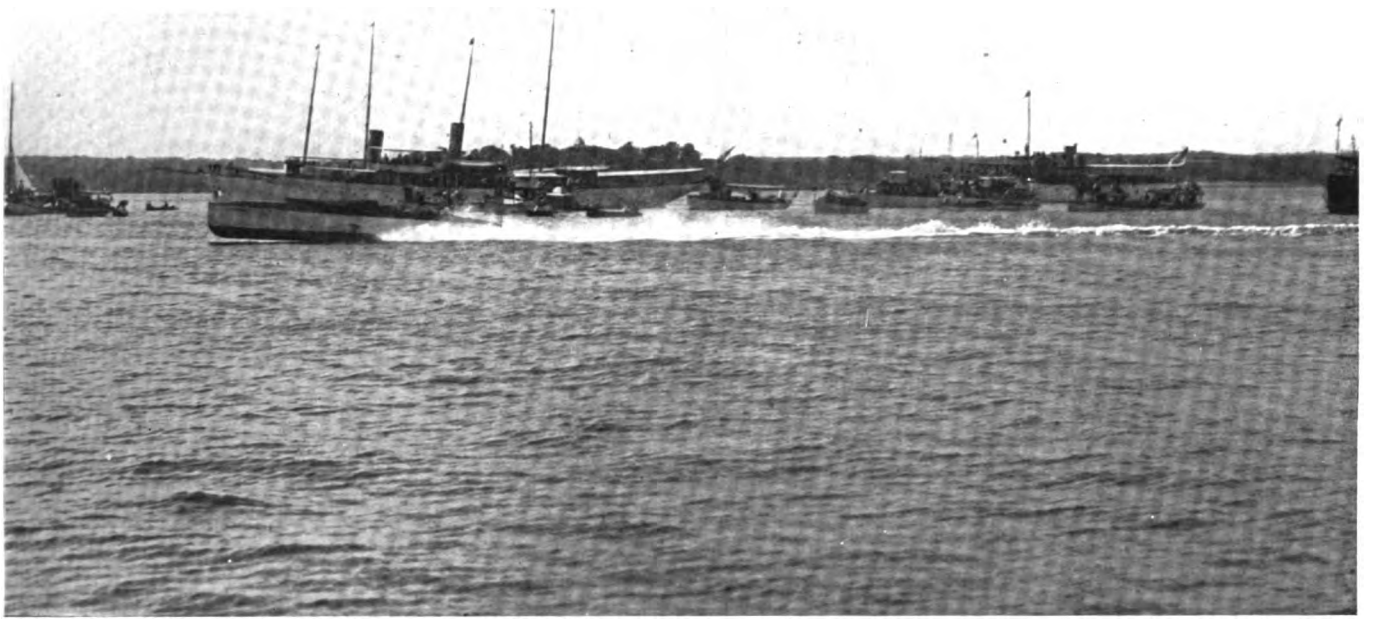
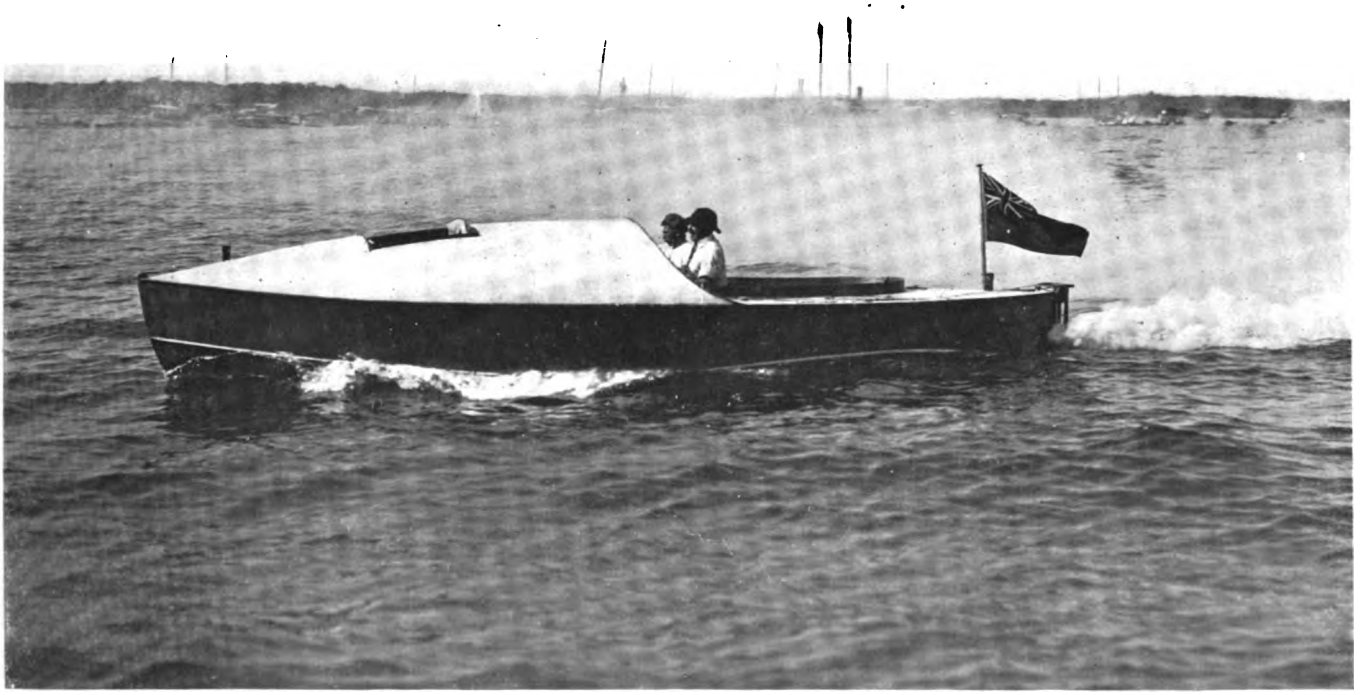


Pioneer Flying by the Committee Boat After Delay Caused by Fire



Zigorella Running Slowly Awaiting the Starting Signal

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another round, and Dixie won easily by over 13½ minutes. In the meantime Nameless had passed away at the first mark and Zigorella had engine troubles which delayed her considerably. Presently she got going again and came around for the first complete circuit, going very fast, but again got into difficulties and was towed in.

For those who care to figure how fast Pioneer was going it might be mentioned that it took three minutes flat for Dixie to pass her after she had stopped, after completing 8½ nautical miles, the time made by Dixie for the 30 nautical miles being 59 minutes 44 seconds, which is at a rate of 30.13 nautical miles or 34.68 statute miles an hour. The course was 10 nautical miles in length and was covered three times.

The three British boats, strange to relate, considering the conservative nature of the people, were all of a type which might be described as *not* being of the "normal" type, and a few years back would have been cheerfully described as freaks. Pioneer, owned by the Duke of Westminster, is a hydroplane designed by Fauber and built by S. E. Saunders, of East Cowes, Isle of Wight. She is 39 feet 11¾ inches over all, 7 feet breadth, and has a twelve-cylinder 400-h.p. Wolseley-Siddeley engine, one of the pair which have done such wonderful work in the Duke's 60-footer, Ursula. The engine has a bore of 7½ inches and a 7½-inch stroke which drives a single screw; the propeller being keyed on the shaft some distance from the end which rotates in a bearing or bracket attached to the rudder.

Her underbody is constructed with six concave planes the sides of which rake aft from the center line, really making twelve planes, and in appearance resembling nothing so much as a gigantic fish with its scales ruffled, if such a vague simile may be imagined.

Zigorella is a peculiar craft, designed and built by the Thornycrofts, 26 feet over all and 6 feet wide, equipped with an eight-cylinder, 120-h.p. Thornycroft engine of 4-inch bore and 7-inch stroke. The hull was built by Luke of Hamble. Above water she looks to be of the regulation type but below water from midships to a point near the stern she looks as if the man who had cut the model had allowed his jack-knife to slip and had gouged a large slice out of each bilge. When Zigorella ran she did very well, but her radius of action was limited as chronicled above.

Maple Leaf II, the challenging boat, unfortunately broke her back before the start, or rather her appearance would lead one to believe that such was the case; for as she lay at her moorings her bow, and particularly her stern, seemed to be all out of plumb and high in the air. She seemed a big powerful craft, but as she did not get going her possibilities could not be determined. It was noticed, however, that her aft sections were considerably hollowed, a method of construction which has been developed by one of the American designers with considerable success in small boats. Maple Leaf II is 39 feet 6 inches over all, 8 feet 4 inches breadth, and has a twelve-cylinder V-type engine of 7-inch bore and 7½-inch stroke developing 400-h.p. It is unfortunate that she was strained and did not get going, for she had every appearance of being a sturdy craft and would have probably done very well had there been any sea.

Analyzing the results of the race the fact comes home that when the six best boats of the two foremost yachting countries of the globe, competing in a race for the championship of the world put up the following record, six contestants, two of which fail to start at all, two failed to finish, and of the balance one loses the contest on account of a breakdown, and only one of the fleet manages to get all the way around without mishap, there is something rotten in Denmark; or in other words, is our record only one in six, 16⅔%, or are we not paying enough attention to detail? The American craft simply were not ready, and again eleventh-hour methods prove a mistake; as for the other fellows, they should have won the mug and its their own fault that they didn't, despite what the experts and the overpatriotic may believe.

SUMMARY

BRITISH INTERNATIONAL TROPHY RACE

LARCHMONT, N. Y., AUGUST 20, 1910

Course 30 Nautical Miles. Start 3:30 P. M.

Boat and Owner	First Round	Second Round	Finish	Elapsed Time
	H. M. S.	H. M. S.	H. M. S.	H. M. S.
Dixie III, F. K. Burnham	3:49:50	4:09:52	4:29:44	0:59:44
Pioneer, Duke of Westminster	4:05:28	4:22:59	4:43:21	1:13:21
Zigorella, D. Hanbury	3:52:29	Did not finish		
Namel's, Heckscher & Melville	Did not finish			
Restless, T. L. Chesebrough	Did not start			
Maple Leaf II, E. Mackay Edgar	Did not start			

View of Part of the Spectators' Fleet

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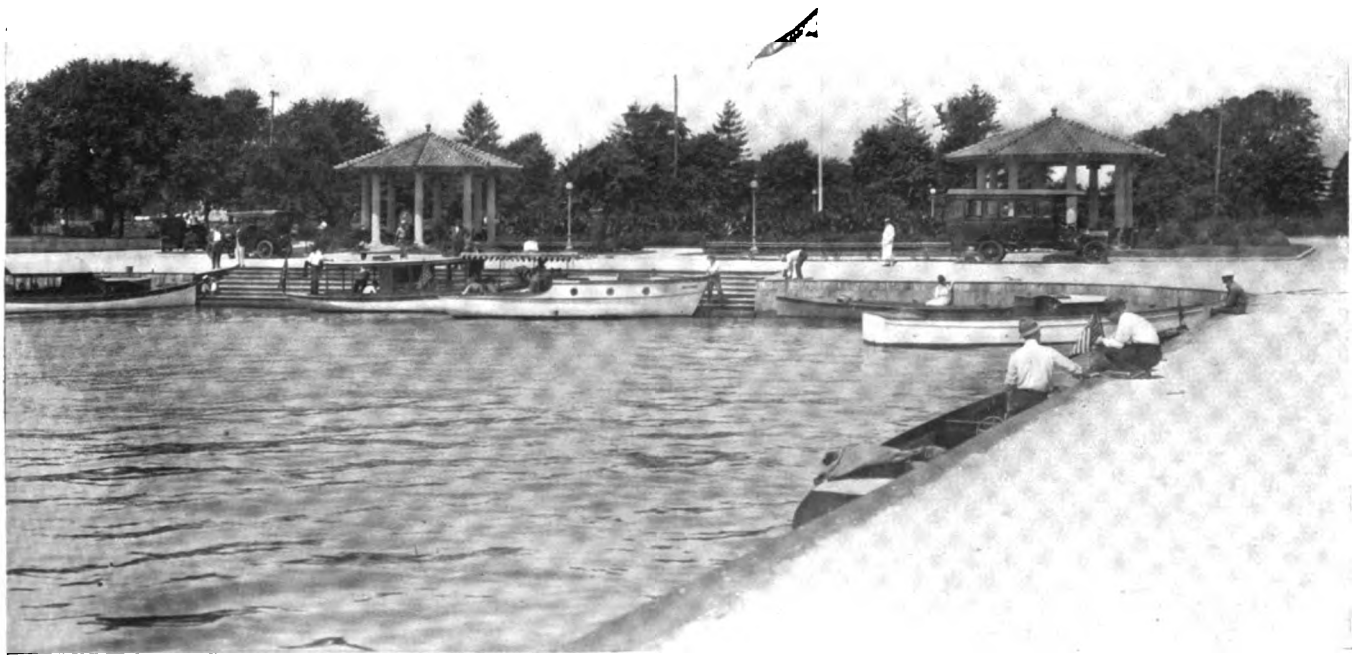
THE BRIGHTWATERS REGATTA

STRETCHING for some fifty miles along the south side of Long Island is a shallow lagoon; separated from the sea by a narrow strip of beach and fed from the ocean by one principal inlet. This is the famous Great South Bay, and the inlet the no less celebrated Fire Island passage. The bay is dotted along its north shore with towns, old and new, whose population, made up of all-year and summer dwellers, use the bay for business and pleasure. The Bay was once noted as a fisherman's paradise, but the use of the pound-net has destroyed most of the fishing, and if their use is much longer permitted fish will soon be as scarce as monkeys in Greenland.

Brightwaters is a new town of summer residents situated exactly north of the inlet, a charming stretch of small lakes, surrounded by pine land, that has been laid out and developed by the T. B. Ackerson Company. The tract stretches from the bay some three miles inland, having an extensive water-front which with great wisdom has been reserved by the proprietors and perpetually dedicated to the use of the residents. To increase this water-front the Company dug a canal, four thousand feet long, and two hundred feet wide and twenty feet deep, forming a safe and accessible harbor in which to moor the Brightwaters fleet.

The control of the water-front, canal, harbor and bathing pavilion is vested in an Association composed of the residents, and it was this Association that gave the first power-boat regatta ever held on Great South Bay. The event was this year confined to power boats, as the racing of sail craft is managed in the Bay by a regular racing organization, and the Association did not wish to conflict with their scheduled events.

I was called in by the Brightwaters people to assist in getting up and running the race, and undertook the task believing that such data would be at hand as would enable the determining of a classification that would permit the racing of all the Bay power craft in their proper classes. On looking into things I found that while there were a large number of boats in the Bay, very few had ever been raced, and that nine-tenths had never been measured and rated, and nobody appeared to know anything definite regarding their dimension or speed. Consequently the committee had to proceed without data,



The Yacht Landing at Brightwaters

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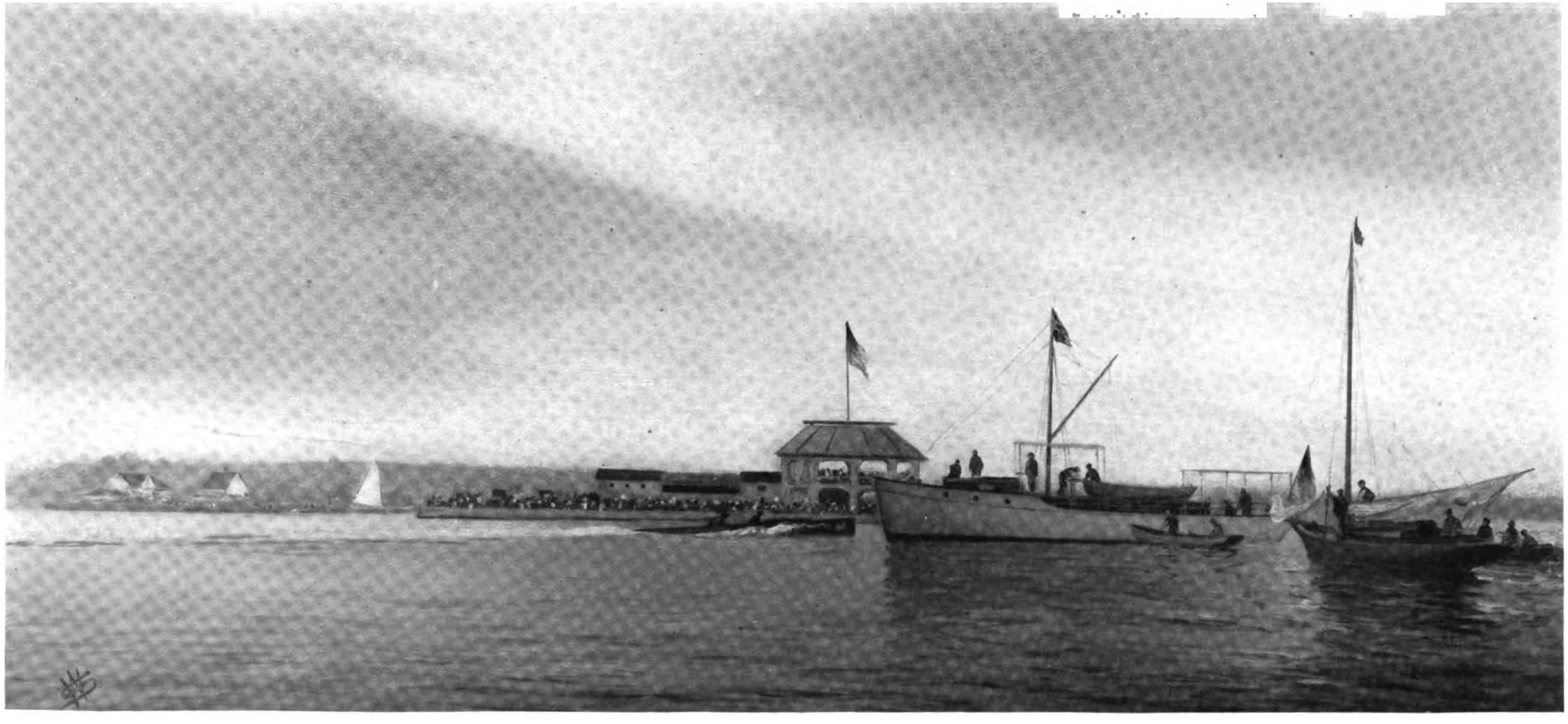

Power-Boat Regatta Brightwaters, L I. At the Finish Line

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and make a rough division of the fleet into three general classes—speed boats, cruisers and open launches. The A. P. B. A. 1909 rules were chosen, and a set of conditions based on them issued.

The result was we received forty-three entries, and of these only five boats had a certificate of measurement, and these were all speed craft, or automobile racers as the rules call them.

We notified all hands that no unrated boats would be allowed to start, and made preparations to measure the entrants—a truly Herculean task as the time was short. We were lucky in obtaining the services of Mr. Charles Meyer, and began the job at 2 p. m. Thursday; by 6 p. m. Friday we had measured thirty-three boats. It was impossible in the short time to measure the engines, so the manufacturer's rating was accepted, except in one or two cases, where experience cast a doubt upon the evidence furnished by plate or catalog. The collection of engines was extremely varied; there were Vims, Standards, Bridgeports, Atlantics, Smalleys, Mianus, Fay & Bowens, Robertses, Jencicks, Craigs, a Twentieth Century, and a half-dozen other and less well-known makes. With the able aid of Measurer Chapman, of the New York Motor Boat Club, who kindly volunteered his services, by 12 midnight the rating and allowances were all calculated and checked and the manuscript ready for the hands of the printer. This is, I think, a record for power-boat measuring, and Mr. Meyer certainly deserves credit for his expeditious work. The job was a hot and continuous one, ten or fifteen boats being in the canal at a time, and their owners all clamoring for the tape and rule. That some errors were made is more than likely, but such were small and did not affect the result.

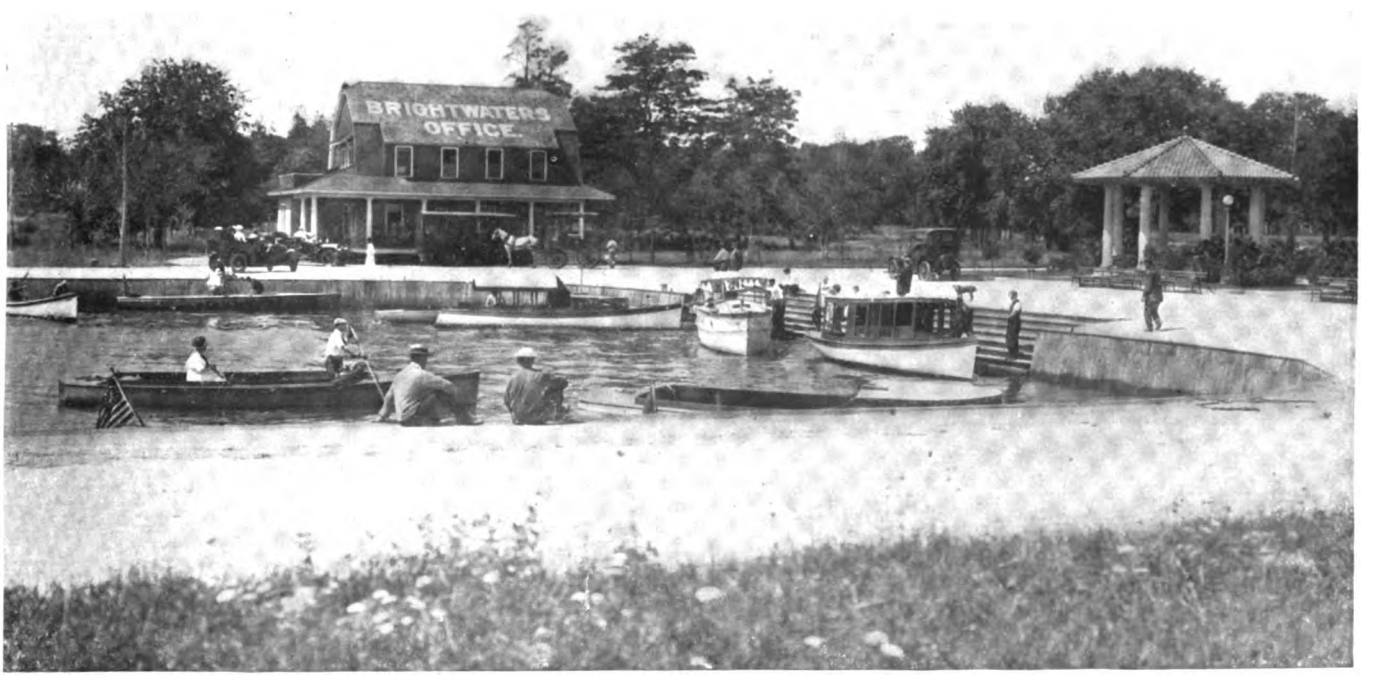
The laying off of the course of seven miles was difficult, as the Bay is very shallow and full of pounds, so that to get the triangle we had to squeeze things very close; but managed to get a fairly deep course with legs of different lengths. The marks were cedar trees centered in a float and well-moored with 150-lb cement blocks.

The starting line was off the Pavilion at the entrance to the canal, the committee boat being Mr. Chas. F. Ackerson's 65-foot cruiser Selma, a Schock design, whose plans appeared in this magazine some few months ago.

The race was started on time and all three classes got away without a hitch. Thirty-five boats started, and all except three finished. Willow Brook was first over in the A Class; she is a very smart craft and went away at a 30-mile gait. Hey There was delayed and dropped over a minute; this delay likely lost her the second prize, as she only escaped winning that trophy by 54 seconds; but once going she slowly closed up the gap on Willow Brook, and in the second leg of the last round passed Mr. Moffitt's craft and finished first. Snitt, and Roy Pid, the winners, are low raters, with a maximum speed of about sixteen miles.

Among the cruisers Lawana got over first but was beaten by Frances, the lowest rated of Class B.

While the public were interested in the high-speed craft, the greatest excitement and rivalry was in the open launch class, a fleet of all sorts and sizes. In this division fourteen started, and all but one finished. Lucy, the



The Lagoon at Brightwaters

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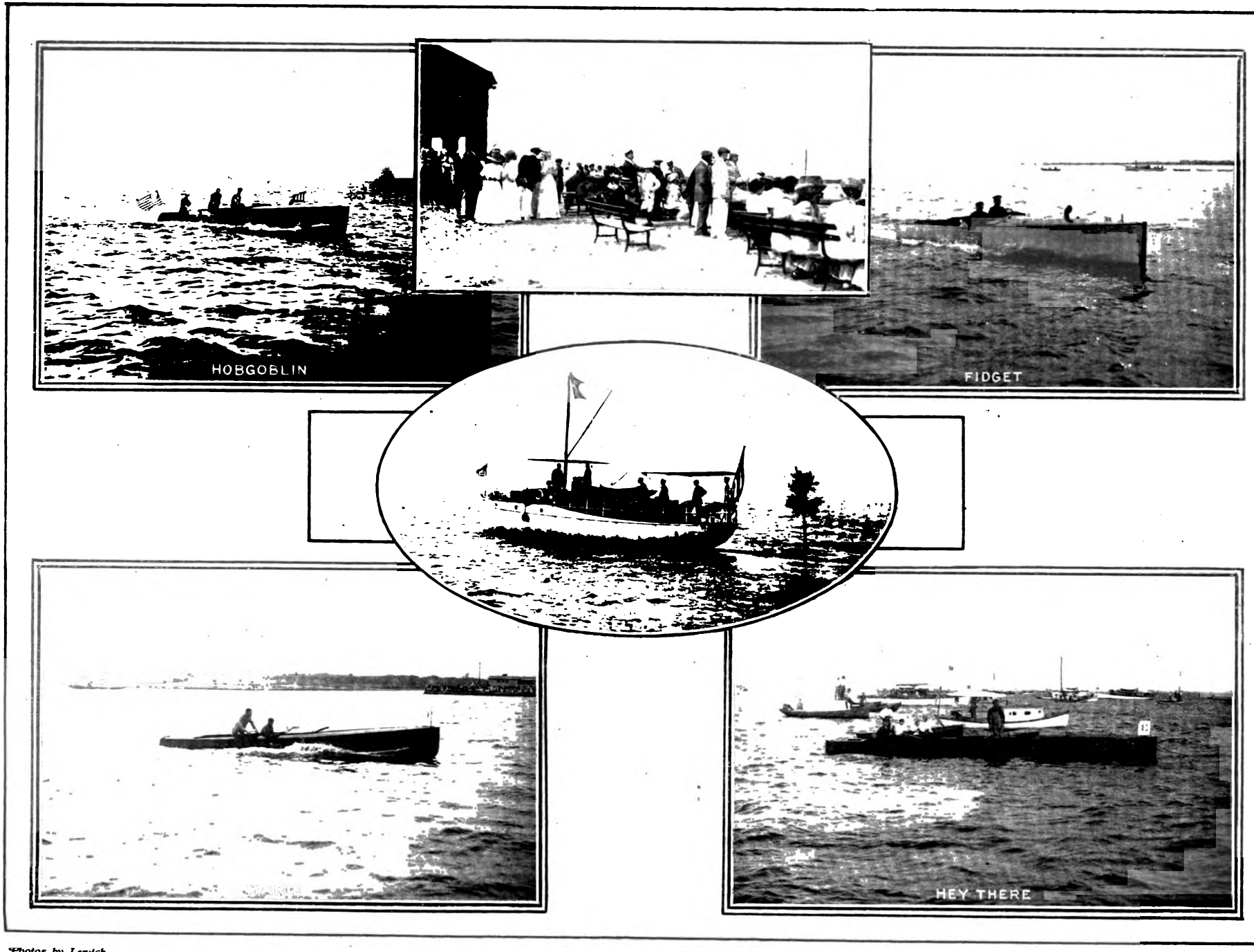

Photos by Levick

Contestants at the Brightwaters Regatta

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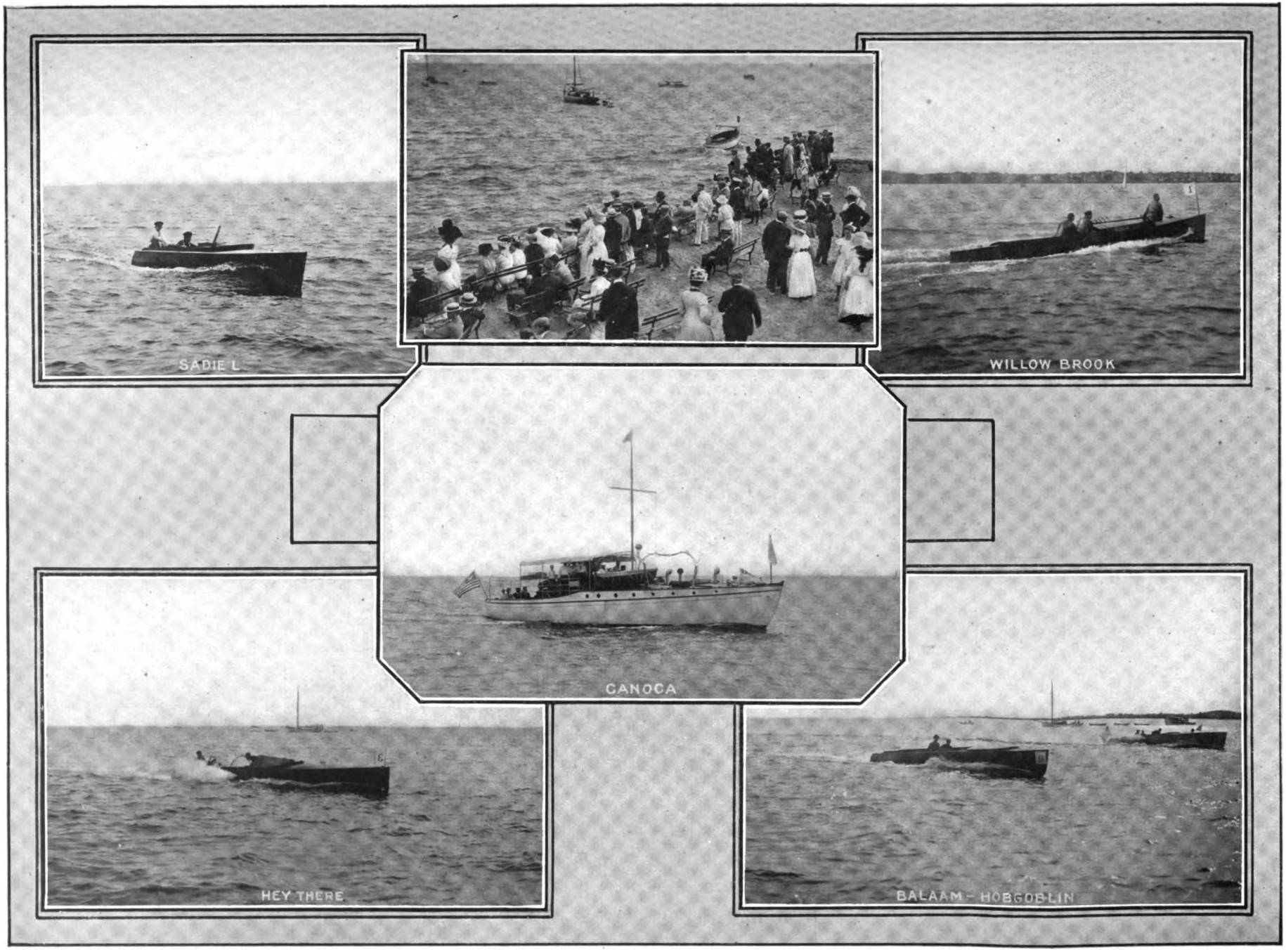

Racing at Brightwaters

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Another View of the Lagoon

scratch boat, was a low-sided V-bottom craft that the rule knocked hard owing to her shape. She is owned by an old Rudderman, Mr. Dunham Wheeler, but speedy as she showed herself, the allowance she had to give was too much, and although first over the course she only managed sixth place, corrected time. Lola, the bottom rater, owned by Mr. J. H. Cummin, was picked by the talent as the winner, but she lost to Eleanor by 26 seconds. The corrected time of the three winners in this class all lay within the compass of a minute, Tautog being beaten by Lola by two seconds.

The race was marred by the unsportsmanlike conduct of several owners of boats not in the race; these men drove their boats over the course and interfered with and annoyed the contestants. The consequence was that one of these men sent his boat into Lance just after that craft crossed the line and badly damaged the racer, another forced Lola off the course. Such conduct shows that these people are ignorant of racing etiquette, as it is not possible that the annoyance was deliberately planned. Years ago we had the same conduct to deal with on Long Island Sound, but it was soon stopped when the racing men ostracized those who were guilty of the offense.

The prizes were presented to the winners that evening at the Brightwaters Casino, the lucky skippers being: Ernest M. Lockwood, silver cup; Roy E. Pardee, silver dish; Freeman T. Hulse, silver cup; W. H. Robbins, silver cup; J. H. Cummin, pair of Da-Nite binoculars; A. L. Stoutenburgh, Vacuum carafe.

The committee having charge of the race were: Thos. Fleming Day, Charles F. Ackerson, Frank Pennington Ball, Carleton E. Brewster.

SUMMARY

Class A

Order of Finish	Name and Owner	Rating	Allowance H. M. S.	Corr'ted Time H. M. S.
9	Toy, Walcott Meserole	112.0	Allows	1:24:56
5	Willow Brook, W. H. Moffitt	107.64	0:01:55	0:42:54
3	Hey There, F. Max Huber	106.1	0:02:36	0:41:30
7	Balaam, John Smith	103.2	0:04:00	0:46:56
–	Princeton III, Addison Roberts	99.6	0:05:51	——
4	Marie, H. D. Smith	86.2	0:13:53	0:42:43
8	Fidget, F. E. Ballard	83.0	0:16:25	0:50:35
–	Kid, F. H. Luning	76.2	0:22:01	——
2	Roy Pid, Roy E. Pardee	61.25	0:38:43	0:40:36
1	Snitt, Ernest M. Lockwood	58.0	0:43:40	0:33:36
6	Lance, Heinrich Brothers	77.2	0:21:08	0:44:33

Class B

7	Lawana, Raymond B. Muncy	56.40	Allows	1:13:42
6	Truant, W. H. Turrell	51.70	0:05:38	1:09:58
8	Sadie, W. H. C. Leverich	50.40	0:07:24	1:13:47
5	Irene F, Thomas R. Farrell	42.80	0:19:41	1:05:50
–	Albertina M, Frank J. Mauser	41.40	0:22:30	——
4	Roly Rogue, Edward H. Terrell	38.00	0:30:01	1:02:19
3	Adria, A. Rogers Lee	37.45	0:31:12	0:55:08
–	Mathilda D, Louis Duysters	35.85	0:35:22	——
2	Phyllis, John A. Wilbur	34.90	0:38:09	0:55:04
1	Frances, Freeman T. Hulse	34.55	0:39:03	0:51:53

Class C

6	Lucy, Dunham Wheeler	57.50	Allows	0:58:51
–	Toothpick, Henry Oakley	54.75	0:03:00	——
1	Eleanor, W. H. Robbins	43.20	0:20:10	0:53:19
13	Agnes C, Thomas F. Evans	42.70	0:21:06	1:21:22
10	Helen V, Percy H. Kittle	42.50	0:21:30	1:06:16
12	Buccaneer, C. H. Norton	41.80	0:22:52	1:19:04
11	Ida, J. H. Newbury	41.70	0:23:05	1:12:18
7	Estelle, W. S. Muller	38.70	0:29:30	0:59:44
4	Acko, P. T. Ackerson	37.10	0:33:30	0:56:42
9	Normada, Thomas S. Miller	34.05	0:41:48	1:02:33
3	Tautog, A. L. Stoutenburgh	33.95	0:42:02	0:53:32
5	Imfe, F. W. Boehmcks	33.63	0:43:20	0:58:35
8	Grace, C. F. Oddie	33.50	0:43:38	1:00:53
2	Lola, J. H. Cummin	29.40	0:58:19	0:53:30

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Vanity, International Rating Class 15 Metres, Owned by J. R Payne, et al, Glasgow, Scotland
Photo by A. E. Beken & Son, Cowes

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Nyama. Owned by H. Marzetti Cowes I. W.

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Polaris 70 Feet O. A Owned by Louis R. Alberger Greenwich, Conn.

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Avenger, 74 Feet 9 Inches O. A Owned by Henry L. Maxwell, Glen Cove, L. I.

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A FIFTEEN-HUNDRED-MILE VOYAGE IN A SUBMARINE

THE cruise was not really dangerous, though we had hard work convincing our wives and sweethearts of that fact, but it was uncomfortable, a thing for which we got very little sympathy. Jules Verne, as I remember my boyhood reading, fitted out his submarine with all the conveniences, including huge plate-glass windows through which the crew could watch the fish and sea-beasts as in an aquarium. Modern warship design has slighted the spectacular for the very practical purpose of blowing up battleships and killing men. Hence our quarters were not palatial, and there were no plate-glass windows.

Submarines have before now made long cruises, but this 1500-mile trip of Salmon from Boston to Bermuda and back is the first time such a craft has boldly struck out on a long sea trip, the other cruises having always been made along the coast, where harbors were available in case of bad weahter. As a demonstration that a submarine can proceed on a long trip independently the trip was a success, although unfortunately it was necessary on account of the demand of the insurance people to accept the seag g ug Underwriter as a convoy. As a matter of fac., Underwriter was spoken only once on the way to Bermuda, when we were nearing the harbor, to announce our intentions in regard to going up to the dock.

The trip had been determined upon some weeks before, but on account of negotiations with the underwriters the start was delayed until July 5th, which gave us a chance to celebrate the Fourth on United States ground, and to hear the results of the Jeffries-Johnson fight. Upon the fifth, at one o'clock all was in readiness for the start except that one member of the crew was missing. The hour's delay caused by waiting for him was taken advantage of by several newspaper men to take our pictures over and over again, in various poses on the ship and on the dock. "If they make so much of us at starting, what an ovation we should receive on our return," I thought. But alas for the vanity of human hopes! When we returned that fickle individual, the American press, had transferred her interests elsewhere, and not one reporter met us at the dock. When the delinquent member of the crew (he was a newspaper man too, by the way) appeared, we cast off the lines from the dock, passed out through the draw of the Weymouth Fore River bridge under our electric motors, and once outside where there was a little room, started our gasolene engines.

This part of the trip was not very exciting. Salmon had many times before been over the same route during her official and builders' trials at Provincetown, and this time, too, Provincetown was the immediate destination, for Underwriter had not yet joined us, and we were to meet her there, before proceeding to sea. As we had more than ample time for the run of only fifty miles, we spent a part of the late afternoon swinging ship for compass deviation. Then we ran into Provincetown Harbor and tied up alongside of the Electric Boat Company's yacht Starling for the night. About ten o'clock Underwriter came into the harbor, and we set seven in the morning for the sailing hour.

The sun arose the next morning over a sea as smooth

Launch of Salmon

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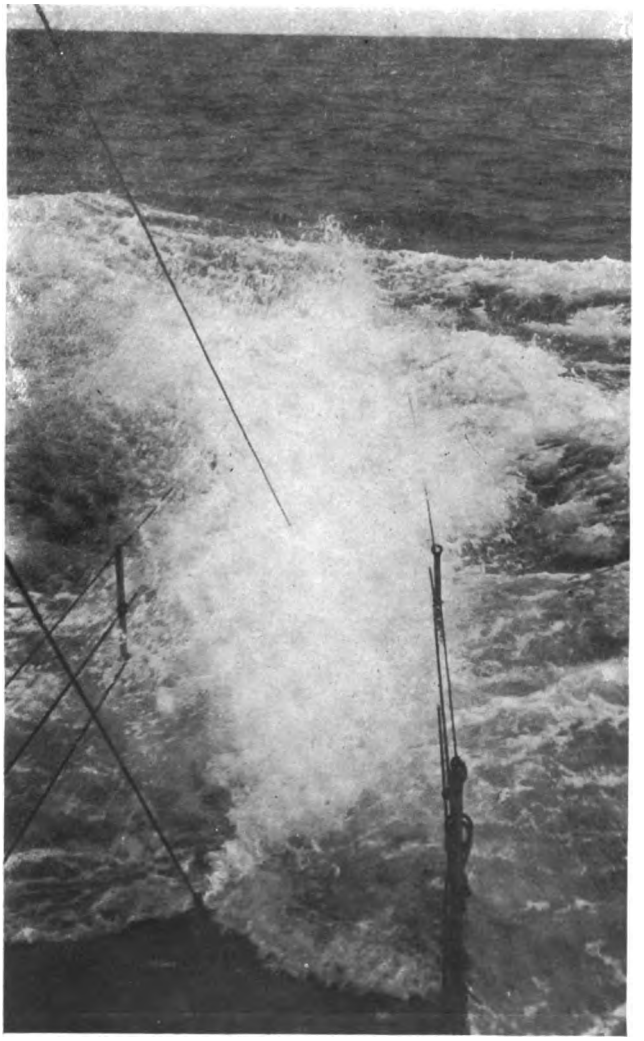
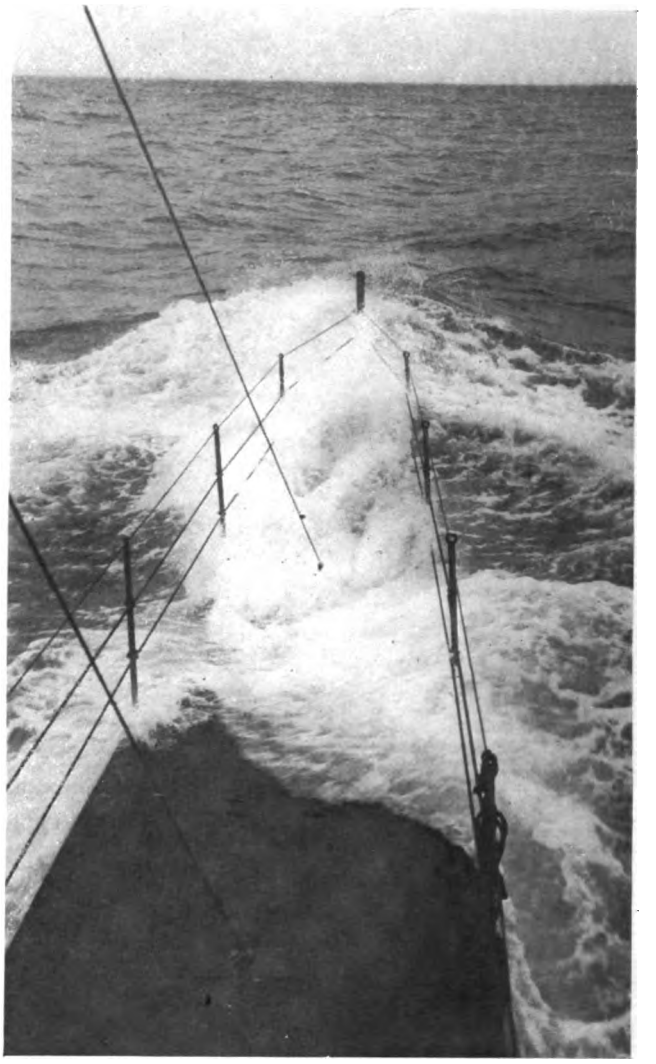
as glass. There was scarcely a ripple on the water, and outside the bay only the long swell of the ocean that never ceases. A more nearly ideal day for the real start on our trip there could not have been if we had had the ordering of the weather ourselves. All the crew who were not on duty below were on deck, or on the little bridge, and we swore that going to sea on a submarine was not so bad, after all. Through the whole day the weather continued perfect, the engines ran smoothly, without missing an explosion, and we looked back at Underwriter belching out black smoke in her somewhat frantic endeavors to keep up, for we were running at just about her top speed. Everything went as merrily as a wedding bell until evening. We were nearing the Gulf Stream, and as the sun set we could see off ahead of us a long line of black cloud. Suddenly it overspread the whole sky, obscuring the stars, and darkness fell all at once. The sea was still smooth, but we knew there was trouble ahead. About eleven o'clock we entered a fog-bank, and just as we entered it the whistle of a steamer was heard. That made us a bit nervous, for if there is one danger in a submarine it is the chance of being struck by some other craft and sunk with all hands on board. The reserve buoyancy is so small that the admission of a very small amount of water would be enough to cause the boat to sink, and in the case of a serious collision the time for the escape of the crew will



Salmon in the Gulf Stream



The Bow of Salmon in a Seaway

be very short, indeed. So we were relieved when, after stopping the engines for a while, we heard the steamer's whistle gradually grow weaker as she drew away from us. For several hours we went ahead slowly through the fog, blowing our whistle and then listening for the whistle of Underwriter, trying to keep at about the same distance from her, so as not to lose our convoy in the fog. And presently the fog lifted, but as it did the wind arose, and when morning broke we were pitching into a nasty choppy head-sea, in the midst of the Gulf Stream.

The next two days were not pleasant. Our crew were largely landsmen, good mechanics, but not sailors, They promptly became seasick, not mildly indisposed, but deadly sick, many of them. The few who did not get sick had double duty thrust upon them, and had their hands full to keep things running. But they did nobly, accepting hours of extra watch without a murmer. We plunged and pitched and rolled along, wondering how long it would take us to get out of the Gulf Stream; as we were running across it at an angle it took us all of that day, which was Thursday, the seventh, and the next. Not a sail in sight; a few blackfish were sighted, and one shark, and several schools of porpoises, and on Friday afternoon the flying fish appeared. The weather did not moderate; it became worse. All the hatches were battened down except the conning tower hatch. Below

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the smell of cooking and of bilge water was everywhere. On the afternoon of Friday two heavy green seas broke over the bridge, carrying away the weather clothes, splitting a few of the hatch gratings, and drenching the two men on watch. Fortunately the two men had a good hold on the bridge railings, or they might have been washed overboard. This was hint enough that it was time to go below. The rest of that afternoon we steered from the interior of the boat, where it was dry and safe, even if smelly with all hatches closed.

Even seasickness has an end. On Saturday the wind began to subside, and the choppy seas gave way to a long swell through which Salmon made her way more easily. The sick ones began to appear on the bridge, looking rather foolish, and very thankful. For the first time since the day of sailing the cooks began to do a normal business. The flying fish became more numerous, and on the waves we saw the pink sails of the nautilus. Three days of sailing South had perceptibly raised the sun, whose rays beat down upon us with an almost tropical warmth. The breeze which blew to us from the Bermudas dead ahead and not so many miles away, was mild and springlike, quite different from the soggy dampness of the Gulf Stream. As night drew on we began to watch for the first glimpse of Gibbs Hill Light, although we knew that we could not sight it much before one in the morning. The calculations of our navigator were justified. At about a quarter of one the loom of the light was sighted in the sky, and promptly at one the light itself was seen on the horizon. We changed course to the Northeast to avoid the reefs that stretch out some fifteen miles to the west of the islands, and shortly after picked up the light on St. Davids Head. Then it was that the navigator had something of a shock. He sighted a third light, although there are but two upon the islands. The mystery solved itself a few minutes later, when the morning star arose in the East. The sea was as calm as the day we left the States. The sun, already very strong at six o'clock, pierced deep into the peculiar whitey-green water, of amazing clearness, where we could dimly make out the coral rocks below. The white barracks of the garrison at the north end of St. George Island were quite close when we picked up the pilot who took us through the tortuous channel between the reefs and the west side of the island to quarantine. There we were not detained long, and before nine o'clock we were tied up at the dock in Hamilton, making inquiries about the customs and the cable office.

I suppose that Bermuda has been described often enough, so that a description from me would be superfluous. Of course it is known principally as a Winter resort, and a few Americans see it in the Summer. Yet it is very pleasant even in the middle of July, no hotter than many of our own seaport towns, and we much enjoyed the three days' interlude between the trip down and the trip back. Fortunately there was but little work to be done on the boat, only a few gaskets to be renewed on the engines, and gasolene to be taken aboard for the return trip. Consequently we had considerable time for rest ashore, which was welcome, for we had most of us not had much chance for sleep on the way down. But I, for one, got less sleep ashore than might have been expected. There were too many other things to do. I am not going to tell what they were. Probably they would be of less interest to others than to me, and they had no connection with submarine boating, which is the theme of this rambling account, if it has one. Let

Salmon at Bermuda. View of Bridge from the Bow

it suffice to say, then, that we arrived in Hamilton on Sunday, that we spent three very pleasant days ashore, and that on Wednesday morning at nine we sailed on the return to Quincy.

The day that we left was as perfect as the day we arrived. In fact, all the days we saw at Bermuda were perfect. The same pilot that brought us in took us out; off St. Davids Head we dropped him, and proceeded North over the glassy sea. Presently the wind again rose, and the sea became choppy, and the scenes of the trip down began to repeat themselves. Not, however, to the same extent, for the crew had become somewhat seasoned, and the weather was not quite as rough. There were some scenes that were amusing to the onlookers, though serious enough, I suppose, to the victims. One poor fellow, lying on his air mattress on the slippery battery deck, sick as a dog, had an extra severe roll throw him off his mattress, which promptly took charge and slid across to the other side of the boat. He never moved nor opened his eyes, but merely said, "I'm not coming after you. You'll come back." When the return roll brought the mattress back, he climbed upon it and resumed his stupor.

The return trip was similar to that down. Same old Gulf Stream, same choppy sea, not quite so high, perhaps, but just about as uncomfortable, and same old

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fog, but more of it. The fog appeared on Friday night, early in the evening. At first it was rather thin, and showed signs of breaking away, but as night came on, it grew thicker, and for fear of losing our convoy, we took a line from her. We hated to do it, for we wanted to make the whole trip with no assistance from the tug. But there was the chance, which the builders could not afford to take, of losing the insurance in case Salmon became separated from her convoy and was lost. So we unwillingly took a tow-line, and proceeded ingloriously on our way. Fogs are not pleasant under the most favorable circumstances, and they are far from pleasant when you are tied up to the end of a tow-line, where you can't maneuver, with nothing but a dinky little air whistle for a fog-signal that makes about as much noise as a good healthy boy blowing on an empty bottle. This fog was, however, more accommodating than most, for just as we approached Nantucket Shoals Lightship it lifted long enough to allow us to take bearings from her and lay a course for Highland Light on Cape Cod. Then again the fog settled down, thicker than before, so thick we could not see a hundred yards. Morning began to break, but the light revealed nothing. Even Underwriter, which was at the end of a very short line, was out of sight. We were passing over fishing grounds, but only once did we see any fishermen. About five o'clock on the morning of Saturday we suddenly sighted two dories, right close aboard. The men in them were standing up watching with astonishment the strange craft that had come to them through the fog. As the sun became higher it began to pierce through the fog, and by nine it was almost clear again. We had expected to make Boston in the afternoon, but gasolene was lacking, due to our losing some overboard. So we put into Provincetown, at the end of Cape Cod, for more. Being from a foreign port we had to go through the customs and quarantine, but before the evening was over we had our gasolene, and were ready for the run to the works of the builders at Quincy on the morrow.

The run from Provincetown to Quincy we made in great style. We speeded up the engines, and made about 11½ knots. It was Sunday, and the harbor all the way in from Boston Light was covered with power boats and small sailing yachts. From them all we received warm salutes, and several followed us up to the works at Quincy. Before we came to the drawbridge at Quincy Point we stopped the engines and proceeded under the motors to the dock. The trip was over, and most of us, I think, were glad. It was safe enough, as I said before, but it was not comfortable. B. R. D.

Dahinda N Y. Y. C. 30-Foot Class, Owned by Geo. Emlen Roosevelt

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GOLD CHALLENGE CUP RACES

HERALDED as the premier races of the year the Annual Gold Challenge Cup races of the American Power Boat Association, recently held at Alexandria Bay, N. Y., proved a fizzle in every sense of the word. Reports that eight magnificent powerful speeders, groomed to the last speck, were daily doing tryouts in the neighborhood of 40 per caused a rush of talent to the historic St. Lawrence, but alas for their hopes, the press agents had put another one over, and after a broken crank-shaft, a few busted cylinders, a disqualification and a lost-in-the woods rumor had been run down, the mighty squadron of America's best dwindled down to Dixie III (for some reason still called Dixie II), Squaw, Skipper and Skit.

Dixie lasted three days and ran as consistently as usual; Squaw ran the first day and again the last day; Skipper failed to complete one race and Skit ran two days; a fine record; only four of the eight to get going at all, and only one of these covered the course three days in succession. For a locality so replete with wealthy men and so full of enthusiastic power-boatmen as this section of the Thousand Islands the exhibition was, to say the least, decidedly tame; but as the trophy will now go to another section of the river we may hope for better results next year.

Last year Dixie defended the cup for the Thousand Islands Y. C., but this year was sold and the new owner, although a member of the club, elected to enter from the Frontenac Y. C. The defending club naming Squaw, a Crane-designed craft very similar to Dixie, with Simplex engines, as the defending boat. When her owners allowed her to run she did very well and, in the opinion of many, would, with a little more power, cause Dixie to be extended to her limit. Skipper is a 40-footer of the normal type and Skit, which carried the hopes of Ogdensburg, the home of the various Chips of history, was a hydro or rather monoplane built from the lines of Viper described in THE RUDDER during the past few months. With the exception of the fact that the craft was lengthened four feet and slightly *improved* aft, she is identical with the original Viper. Unfortunately Mr. Leighton only had thirty days to build boat and engine, and she wanted about thirty more days of tuning up. Before the races, according to her owner, she did better than 32 miles per hour, but troubles which didn't come singly put her out of the running, and while she added much to the spectacular side of the regatta she never was a serious contender.

The races were held over the old course from Alexandria Bay down the river, and three circuits were supposed to represent a distance of 32 statute miles. The three days' racing was started on August 4th, and on account of a brisk wind which blew down the course the first race was postponed and the craft did not get off until 6 p. m. The spectators meanwhile, who could only see the best part of the course, voiced their disgust in no uncertain terms. Finally at 5:55 p. m. the preparatory gun was fired and at 6 p. m. they were off for a fair to middling start. Dixie, steered by her owner, impatient apparently at the delay, humped her back a trifle and decided the final result of the racing, barring accidents, in just about 30 seconds after the start. The uninitiated held their breath for another 19 minutes until Dixie shot around for the first circuit followed by Squaw about a minute later, with Skipper two minutes behind her, and Skit away back; but after this thrill the small boys were back to mumblepeg, and so far as any real interest was concerned the great races were over. A few poor souls "guessed that maybe Dixie would break down," but she

Start on the First Day of the Gold Challenge Cup Races of the American Power Boat Association

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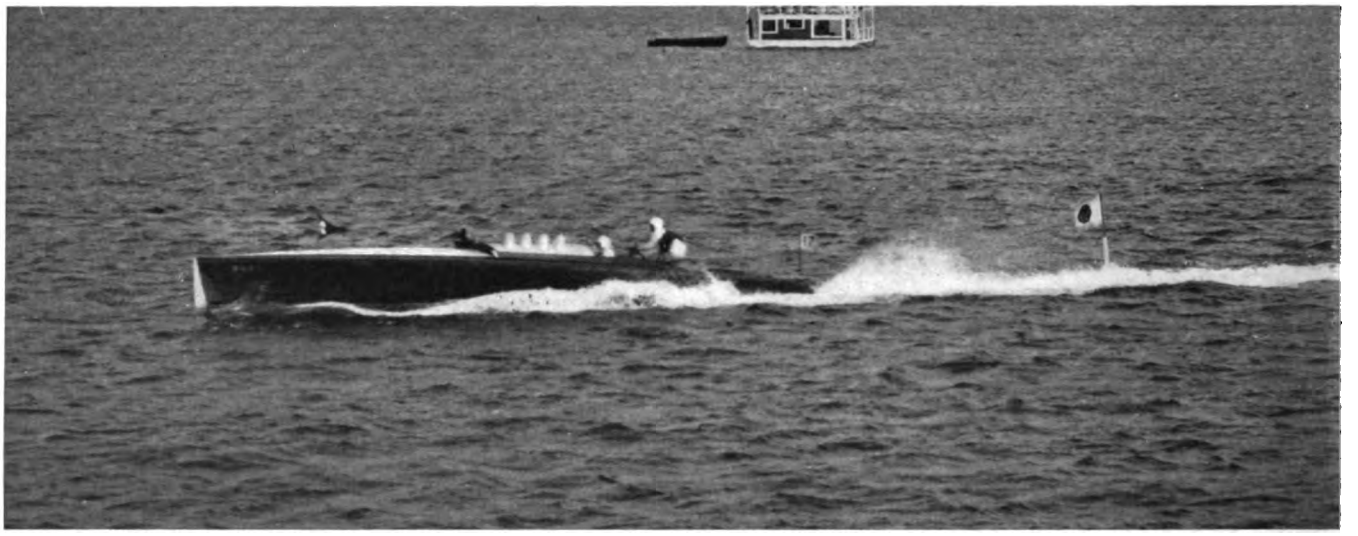
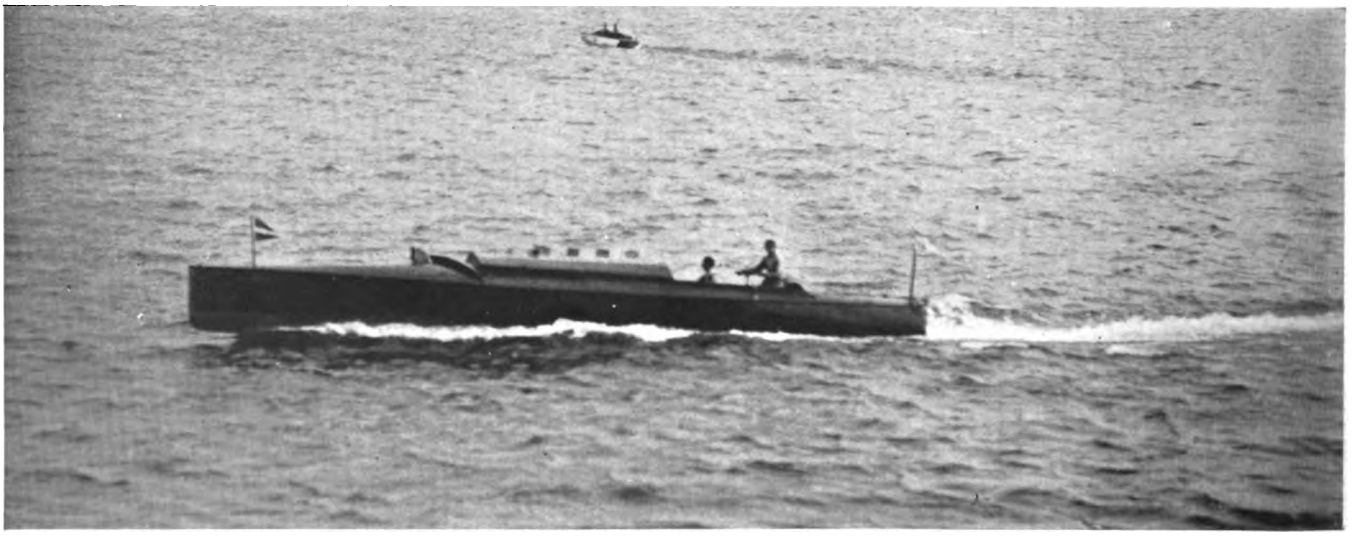


Dixie III, Representing the Frontenac Y. C. Won the Series

Squaw, the Thousand Island Y. C. Representative, Which Craft Failed to Defend the Cup



Skipper Represented the Chippewa Bay Y. C

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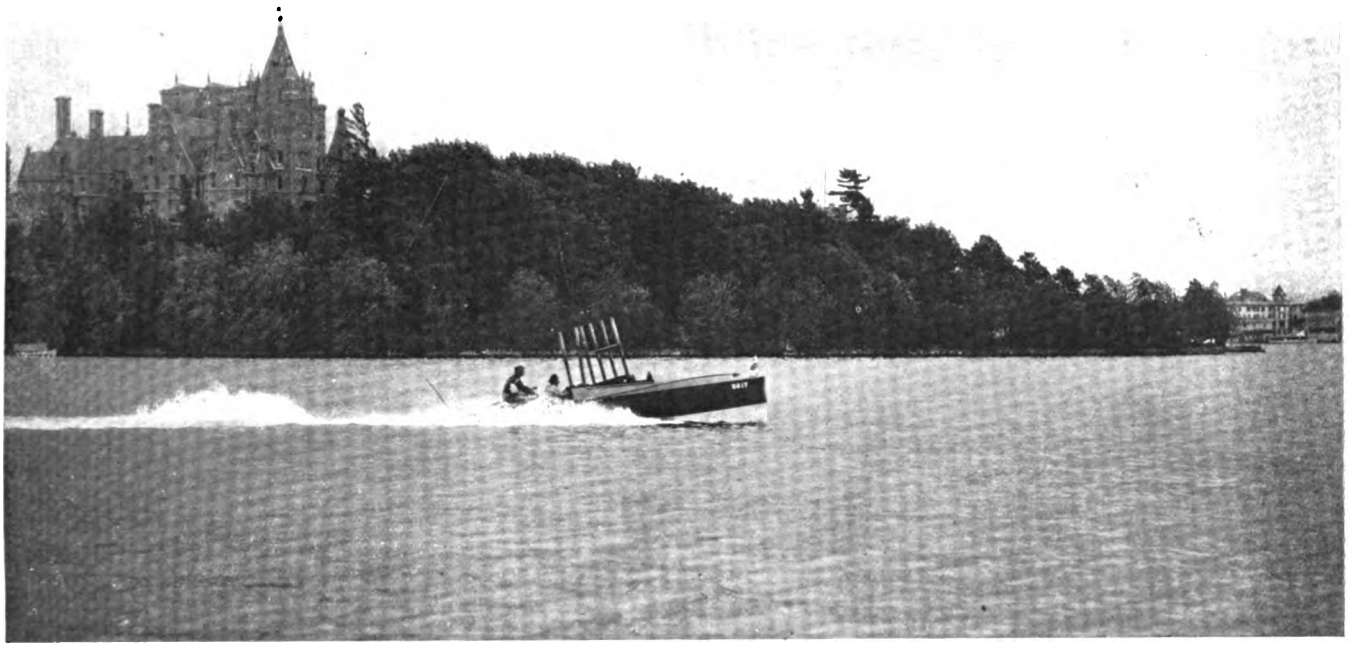


Skit, a 24-Foot Viper with 6-Cylinder, 100-H.P. Leighton Engine, Carried the Colors of the Clayton Y. C.

went about her business as usual, and on the second lap was slightly over a minute in the lead of Squaw, with Skit last and Skipper stopped down the course. At 6:57:14 Dixie crossed the line, winner of the first race of the series, having covered the course of 32 statute miles in 57 minutes 14 seconds, with Squaw just exactly one minute behind; the unfortunate Skit, with the redoubtable Charlie Fauth working like mad on the machine, some 16½ minutes in the rear.

The second day brought forth only Dixie and Skit, while Squaw, the only craft capable of making an interesting race with Dixie, lay snugly in her boathouse because the course was too ruffled to permit of her running. For two rounds Dixie played with Skit until on the final circuit the little boat was put out of business on account of drenched ignition, and Dixie finished majestically alone, her dash across the line bringing forth about three weak toots and a few sad-voiced cheers.

On the last day, Saturday, quite a crowd of spectators' boats appeared on the course and by way of variety Squaw came out, while Skit, still suffering from acute indigestion of the commutator, remained ashore, Skipper being still off the scene. Promptly at four the procession started and both craft completed the course without accident, incident or enthusiasm; a little diversion being caused by one tiller of the soil, down for the day, who walked absentmindedly off the end of the wharf.

Given the same power as Dixie III, Squaw would have provided some prime racing, but the result was never in doubt and the cup went to Frontenac. Dixie thus enjoying the unique distinction of having defended the cup for the Thousand Islands Y. C. last year, and winning it from the club this year.

SUMMARY

AMERICAN POWER BOAT ASSOCIATION

GOLD CHALLENGE CUP RACES

August 4, 5, 6, 1910. Start 6 P. M. Distance, 32 Miles

FIRST DAY, START 6 P. M.

Boat	First Round H. M. S.	Second Round H. M. S.	Finish H. M. S.	Elapsed Time H. M. S.	Points
Skipper	6:21:53	Did not finish			
Dixie III	6:19:04	6:38:21	6:57:14	0:57:14	4
Skit	6:25:11	6:50:20	7:15:45	1:15:45	2
Squaw	6:20:00	6:39:28	6:58:26	0:58:26	3

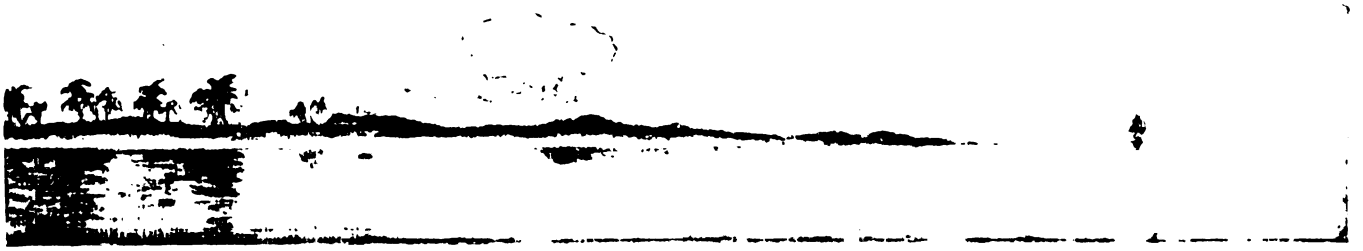
SECOND DAY, START 4 P. M.

Skipper	Did not start				
Dixie III	4:21:24	4:42:50	5:04:20	1:04:20	4
Skit	4:24:35	4:48:48	Did not finish		1
Squaw	Did not start				

THIRD DAY, START 4 P. M.

Skipper	Did not start				
Dixie III	4:19:12	4:38:39	4:57:20	0:57:20	4
Skit	Did not start				
Squaw	4:19:28	4:38:50	4:57:30	0:57:30	3

Total Points: Dixie III 12, Squaw 6, Skit 3



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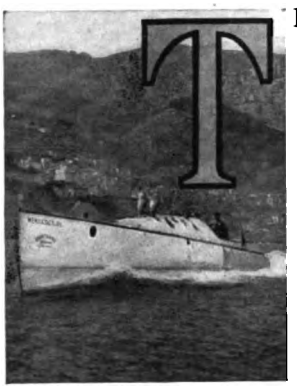
THE RESISTANCE OF POWER BOATS AND A METHOD OF MEASURING SAME

Seth G. Malby



THE object of this thesis is to show something about the resistance of power boats and to develop a method to measure this resistance. The subject can conveniently be divided into three parts. First, resistance in general as applied to ships; second, resistance as applied to power boats, and third, the method of measuring same.

Where there is relative motion between solids or fluids in contact with one another, there is encountered a force which tends to resist this relative motion. This force is known as resistance. When a block of wood slides over a surface of iron it encounters air resistance as also the resistance due to the contact of the wood and the iron. This retarding force is due to the intermingling of the molecules of the air and the wood in one case and of those of the wood and iron in the other. When a ship moves through the water it encounters a force tending to retard its motion and to finally reduce its velocity to zero; this is due to the intermingling of the molecules of the parts of the ship with the air and also to the intermingling of the molecules of the submerged part of the ship with the molecules of the water. If, however, the immersed body is at rest all the forces acting on the body are normal, the resultant of the horizontal forces is equal to zero and the resultant of the vertical ones must equal the weight of the body. With the body at rest, therefore, we encounter no resistance. As we are to study the forces tending to retard a body we must have relative motion and therefore we will assume hereafter that relative motion exists between the ship and the water. When such motion arises the surface forces undergo marked changes in both magnitude and character. The normal pressures are more or less changed in amount and distribution and, in addition, tangential forces, which were entirely absent when the body was at rest, are now called into existence. In consequence the horizontal resultant is no longer zero, but a certain amount R, the equal of which must be constantly applied in the direction of motion if uniform movement is to be maintained. The entire vertical resultant must of course equal the weight. This resultant, however, may be considered as made up of two parts, one due to motion, the other due to the statical buoyance of the portion immersed. The sum of these two will equal the weight. Hence when in motion the statical buoyancy will not in general be the same either in amount or distribution as for the condition of rest.

The amount and distribution of the surface forces depends upon first, for the body, (a) the geometrical form and dimensions of the immersed portion, and (b) the character of the surface in contact with the fluid; second, for the liquid, (a) its density, and (b) its viscosity; and third, the relative motion.

The resistance as encountered by ships may be divided into three parts; first, we have the frictional resistance or the resistance due to the friction of the water on the surface of the shell; second, the eddy-making resistance. If we tow a blunt piece of wood through still water there will be noticed in the front and rear of the piece that there will be regions in which the water will be in a violent state of agitation. These regions are known as eddies and it has been noticed that for this case the water has no well-defined direction. Third, we have the wave-making resistance or the resistance due to the formation of waves. The air resistance may be neglected as far as the normal type of boat is concerned.

Taking up the frictional resistance, we find that this phenonema depends upon the following: first, the area of the immersed surface; second, its nature; third, its length; fourth, the density of the water; fifth, the velocity.

Let F equal the frictional resistance, A the area of the wetted surface, V the speed, f equal the coefficient depending upon the nature and length of the surface, then in general F equals fAV^n. It has been experimentally determined that the resistance varies directly as the density of the fluid.

Considering the eddy-making resistance, we have already seen its general character, and while it is probable that it follows no general law it may be assumed to vary directly as the square of the velocity; but it will vary in amount according to the shape of the ship and the general character of the underwater body. Thus a ship which has the full stern and thick stern-post will experience this form of resistance to a much greater extent than a vessel with a fine stern and stern-post and rudder of moderate thickness. It is possible to reduce this resistance to a minimum by paying special attention to the appendages in the form of rudders, stern-posts, etc., and to the endings of the vessel.

We will now take up the wave-making resistance. A completely submerged body moving at any given speed will only experience resistance due to the surface friction and eddy-making provided the body is sufficiently immersed; but with a body moving at the surface such as we are to deal with, the resistance due to the forma-

NOTE—The above thesis is the property of Cornell University.

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tion of waves becomes an important factor, especially at high speed. Suppose we immerse a body far under the surface and water is caused to move past this body at a certain speed. The particles of water will move past the body in certain lines, which we will call stream lines. Ahead of the body these lines will be straight, but as they move up to the body and pass the lines will be diverted from their course and will again become parallel after the body. We can imagine these stream lines making up the boundaries of stream tubes in each of which the same particles of water will flow throughout the operation. Now as the stream lines approach the body they broaden, and consequently the particles of water slacken speed. Abreast of the body the streams are constricted and there is a consequent increase in speed, and at the rear of the body the streams again broaden with a decrease of speed. Water flowing in the way described, any increase of speed is accompanied with a decrease in pressure; and any decrease in speed is accompanied with an increase of pressure. We may say, therefore, first, there is a broadening of all stream lines and attendant decrease of speed and consequent excess of pressure near both ends of the body; and second, there is a narrowing of the stream lines with attendant excess of speed and consequent decrease of pressure along the middle of the body. It will be noticed that the variations of velocity and pressure must necessarily become less as we go farther away from the side of the body. A long way off the stream lines will be parallel. A body with frictionless water moving past it does not experience any resultant force tending to move it in the direction of motion. Passing from the hypothetical case to that of the vessel on the surface of the water, we will see that the water is free from all forces except the atmospheric pressure and any excess of pressure at the bow and the stern shows itself by the elevation of the water at the bow and the stern, and the decrease of pressure along the sides shows itself by the depression of the water along the sides. Observations show that there are two separate and distinct series of waves caused by the motion of the ship through the water: first, at the bow, and second, at the stern. Each of these series of waves consists of, first, a series of diverging waves the crests of which slope aft and a series of transverse waves whose crests are nearly perpendicular to the center line of the ship. As the speed of the ship increases the diverging waves become larger and consequently represent a greater amount of resistance. The transverse waves show themselves along the side of the ship by the crests and troughs. The length of these waves, that is, the distance between crests, bears a definite relation to the speed of the boat. This relation is that the length of the wave varies as the square of the speed at which the boat is traveling. It will be seen that as the speed of the boat increases, the length from crest to crest of the accompanying series of transverse waves increases very rapidly. Carrying the wave resistance farther, we see that for certain lengths we get a coinciding of the bow and of the stern waves. When the crest of the bow wave coincides with the crest of the stern wave the wave-making resistance is at its maximum, and when the crest of the bow-wave series coincides with the troughs of the stern-wave series the wave-making is at a minimum. These three constitute the divisions of resistance as a whole.

To Mr. William Froude is due the credit for a greater share of our knowledge of the resistance and propulsion of ships. In 1871 he towed H.M.S. Greyhound behind H.M.S. Active. A boom was rigged out from the side of Active and a tow-line attached to the end of this boom; this arrangement was necessary so that Greyhound would not be affected by the wake of Active. Active was run at various speeds and the tow-line pull measured by means of a dynamometer. In this way a speed-resistance curve was gotten for Greyhound.

We have before used the term speed but not the term corresponding speed. The law of corresponding speed is that in comparing similar ships with one another and ships with models, the speeds must be proportional to the square root of their lineal dimensions. Also we have the law of comparison, which is as follows: if the linear dimensions of a vessel be m times the dimensions of the model and the resistance of the latter at speed V_1, V_2, V_3, etc., are R_1, R_2, R_3, etc., then, at corresponding speeds of the ship $V_1\sqrt{m}$, $V_2\sqrt{m}$, $V_3\sqrt{m}$, etc., the resistance of the ship will be R_1m^3, R_2m^3, R_3m^3. In passing from the model to the ship there is a correction to be made because of the different effect of the water on the longer length. The law of comparison strictly applies to resistance other than frictional; that is, to the residual resistance.

To prove the law of comparison Mr. Froude made a model of Greyhound and measured the resistance by means of a dynamometer. The model was towed at speeds corresponding to the speeds of the boat in an experimental tank and a speed resistance curve gotten. Using the above laws it was found that the resistance other than frictional obeyed the laws of comparison; that is, that this resistance varied directly as the mass at corresponding speeds. Frictional resistance may be expressed by the formula $F=fAV^n$, as explained before. F equals the resistance in pounds, f is the frictional coefficient depending upon the nature of the surface and the length, A is the area in square feet, and V is the speed in knots and if Froude's coefficients of friction are used n=1.825. Using this formula for the frictional resistance and the law of comparison for other than frictional resistance, the curve of the boat was found to coincide with the curve deduced from the results of the experiments on the model. Other experimenters afterward made similar tests and have proved beyond a doubt that the laws are correct. A curve of Mr. Froude's coefficient for various lengths may be found in the following table. These coefficients were

L	f	L	f	L	f	L	f.
5	.054458	55	.013181	15	.010937	65	.009443
10	.032827	60	.012912	20	.010530	70	.009398
15	.024964	65	.012502	25	.010277	75	.009365
20	.021070	70	.012251	30	.010100	80	.009339
25	.018701	75	.012182	35	.009946	85	.009307
30	.016910	80	.011968	40	.009816	90	.009280
35	.015754	85	.011840	45	.009714	95	.009255
40		90	.011745	50	.009629	100	.009230
45	.014151	95	.011664	55	.009560		
50	.013622	100	.011610	60	.009500		

Froude's Coefficients of Friction for Various Lengths

determined by experiments on planes of the lengths as given except for the longer ones, which were gotten by producing the curve. Sheet No. 1 gives Mr. Tidman's results for the coefficient of friction and the exponent of the speed for use with the coefficient.

For the same ship, supposing the mass equal to m, V equal one speed and V_1 some other speed, then R, the resistance at V, would vary directly as the square of

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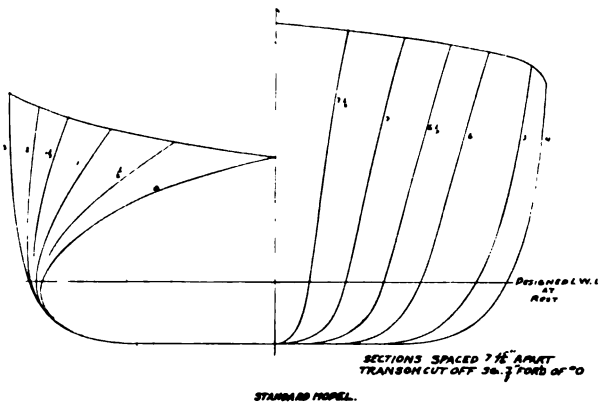
Tidmans Coeficients of Friction and Exponents.

L	f	n
10	.01124	1.853
20	.01075	1.849
30	.01018	1.844
40	.00998	1.8397
50	.00991	1.8357
100	.00970	1.829
150	.00957	"
200	.00944	"
250	.00933	"
300	.00923	"
350	.00916	"
400	.00910	"
450	.00906	"
500	.00904	"

Sheet No. 1

the speed, or $\frac{R}{R_1} = \frac{mV^2}{m\,V_1^2}$; m will cancel and we will have the resistance varying directly as the square of the speed. By reference to any of the curves plotted it will be seen that this law does not hold for all speeds, we cannot calculate the resistance of the ship by any simple formula and must therefore resort to experiment to determine resistance for the various speeds.

Now that we have informed ourselves of what constitutes the resistance of a vessel, what practical use can be made of this information? If R equals the resistance of a ship and V equals the speed in feet per minute, then the H.P. necessary to drive the hull at speed V will be $\frac{RV}{550}$. This is known as the E.H.P. We have the I.H.P. of the engines of the ship from the indicator card, and formula I.H.P.$= \frac{P\ L\ a\ n}{33{,}000}$, where P equals mean effective pressure, in the cylinder, L equals the length of the stroke in feet, a equals the area of the piston in square inches, (supposing that the M.E.P. is in pounds per square inch), and n equals the revolutions per minute. The I.H.P. in being transmitted to the propeller suffers some loss due to friction, etc. The I.H.P. minus the frictional losses in H.P. equals the B.H.P. The B.H.P. is transmitted to the propeller; there are losses of the B.H.P. in the propeller, and E.H.P. equals B.H.P. minus the losses in the propeller in H.P. The ratio of the E.H.P. to the I.H.P. is known as the propulsive coefficient.



Sheet No. 3

Having seen just what the resistance is and the laws governing same, we will try and investigate the resistance as applied to power boats. As far as the regular form boat is concerned, very rarely is a $\frac{V}{\sqrt{L}}$ ratio of 3.2 exceeded, and the most common ratio is in the region of .9—1. These small power boats sometimes

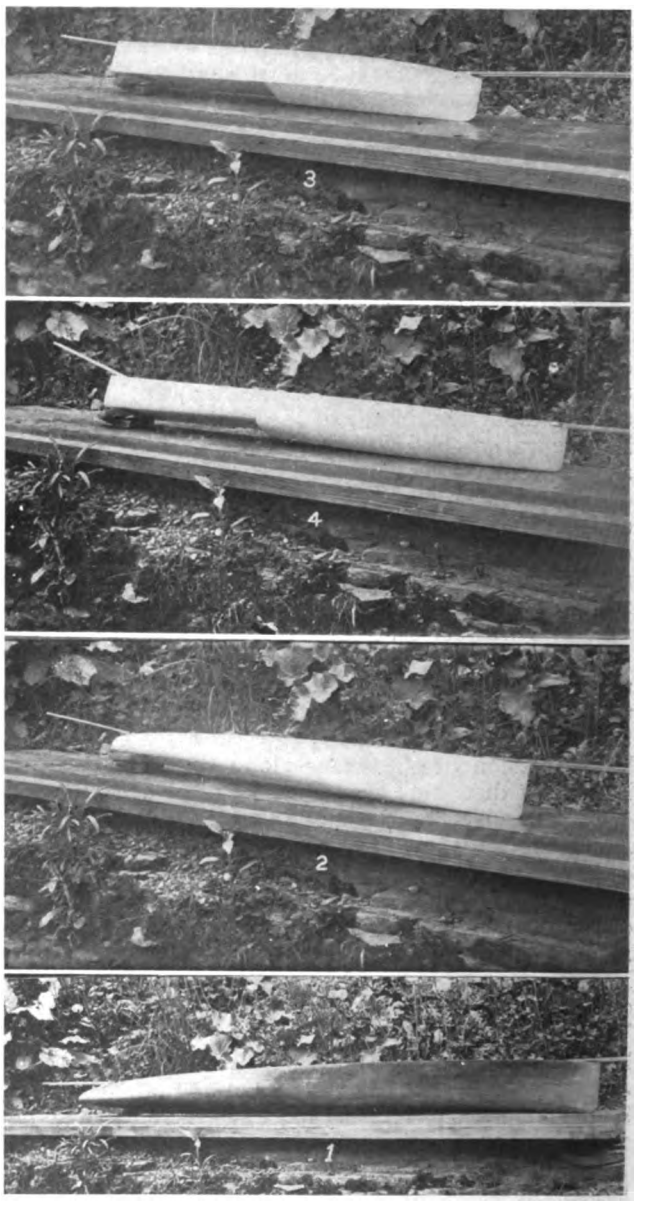


Plate No. 7

have a $\frac{V}{\sqrt{L}}$ ratio of 5.5 to 6, so it will be seen that we are far out of the range of the regular boat form, and it would be quite natural if we found some things which do not agree with the usual practice.

Experiments were made on four different models, namely, the standard model, lines on sheet No. 3, curve on curve sheet No. 3; model No. 1, lines on sheet No. 2, curve on curve sheet No. 2; model No. 2, lines on sheet No. 5, curve on curve sheet No. 5; model No. 3 curve on curve sheet No. 4, lines on sheet Nos. 4 and 4a.

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By examination of the lines of the standard model it will be seen that the keel is straight, that she is fairly fine forward, and that the coefficient of the after water plane is in the neighborhood of unity, that is, in taking the widest part of the water plane aft and multiplying this by ½ of the length and then dividing the actual area of the water plane by this amount, we will get 1. She has a slight flare forward and a tumble-home aft. The bottom forms a plane which is the shape of a triangle forward and a rectangle aft. On plate No. 7, model No. 1, is the photograph of a standard 5-foot model. On plate No. 8, model No. 8, is the photograph of the 3-foot standard model. By reference to the speed resistance curve it will be seen that the resistance increases at a less rate than the ratio of the square of the speed up to 10 knots. From 10 to 11 knots the resistance is directly as the square of the speed, and from 11 to 13 knots at a greater rate than the square of the speed. In the region of about 13 knots the boat is in a period of instability and we get a decided drop in the resistance due to the rising of the boat caused by the excessive speed. After this point is once passed it will be seen that the rate of increase is again reduced. The resistance increasing about as the ratio of V to the 1.2 power. This proportional rise in resistance may be seen best by reference to the curve plotted on log paper; this will be found on curve sheet No. 8. As to the performance of the

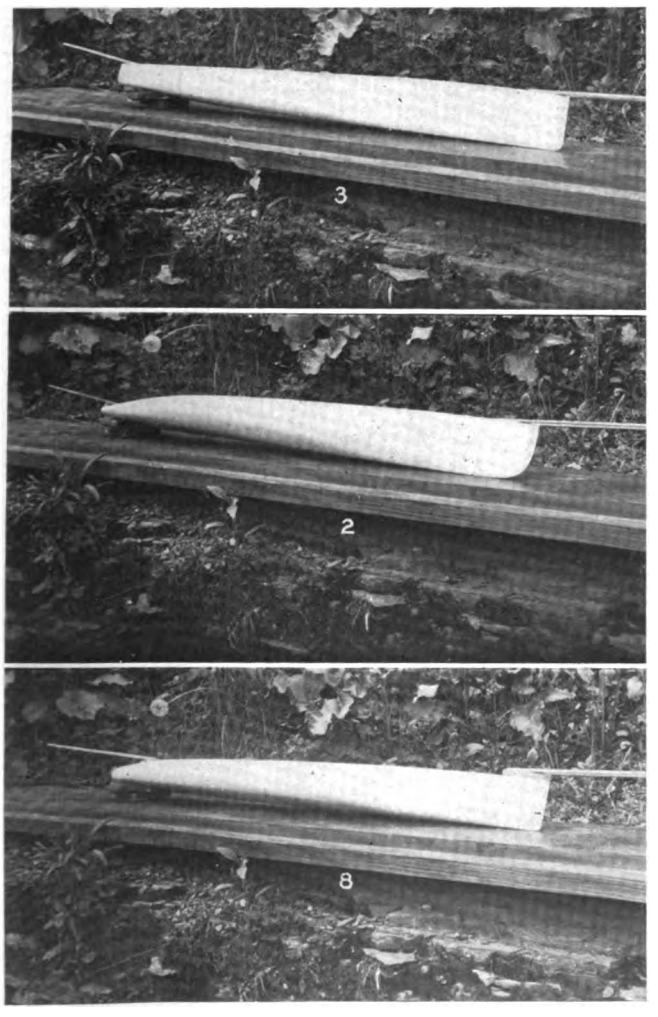
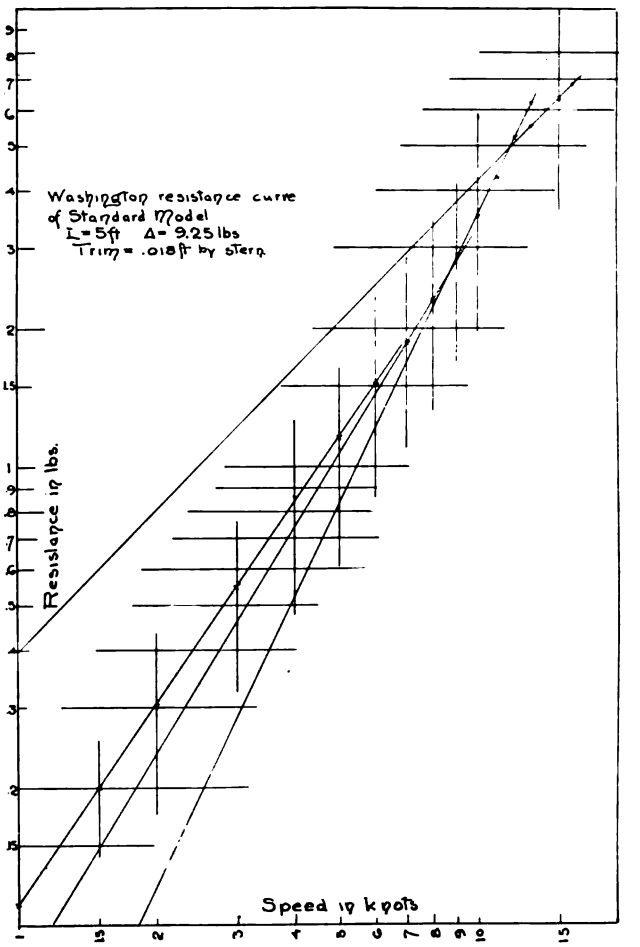


Plate No. 8



Curve Sheet No. 8

model on trial if loaded parallel to the L.W.L. at rest, the model would begin to trim badly by the bow at a speed of 9.5 knots and would finally disappear under the surface of the water at a speed of 10 knots. If trimmed by the stern it did not seem to affect the resistance for the lower speeds, and instead of trimming by the bow the model would trim more and more by the stern until the speed of 13 knots was reached. At this speed the boat rises bodily out of the water so that she seemed to have about one-half of her displacement at rest. The bow wave for the lower speeds is of a hollow character, that is, it is very thin and seems to come up and then lap over in an easy curve. This wave continues to augment as the speed rises until about 12.5 knots and then the wave changes from the hollow character to one of solid water of much less magnitude. As to the trim. At a speed of 5 knots the model begins to trim by the stern more and more as the speed is increased, but at a speed of 13 knots the boat tends to trim slightly by the bow and this condition is maintained for the higher speeds.

The cause of the boat sinking at a speed of 10 knots when trimmed parallel to the L.W.L. when at rest is, that at this point the bow wave, having reached a considerable magnitude and the boat trimming badly by the stern, she is just balanced on the top of this bow wave. As the speed increases a little and the wave moves farther aft equilibrium is destroyed and the boat simply topples over on the top of this wave and sinks. As to the cause of the boat rising hardly a suitable explanation can be given. There are many theories on the

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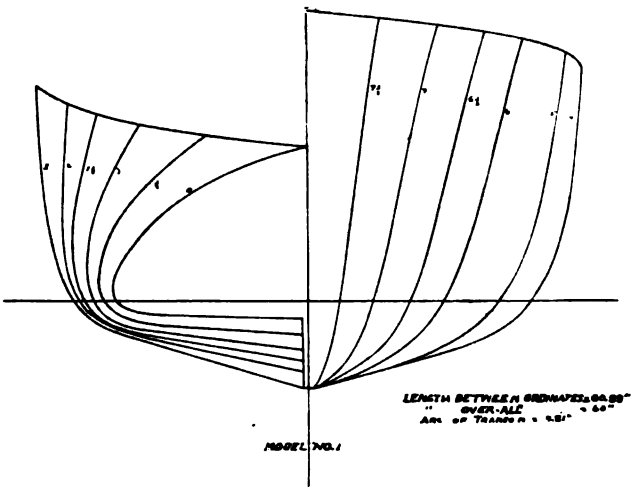
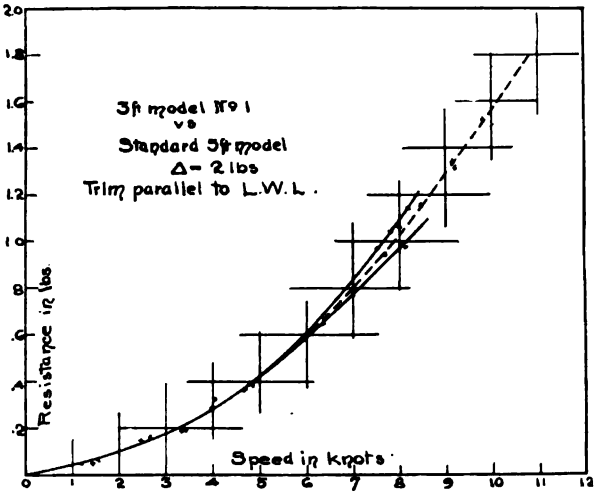


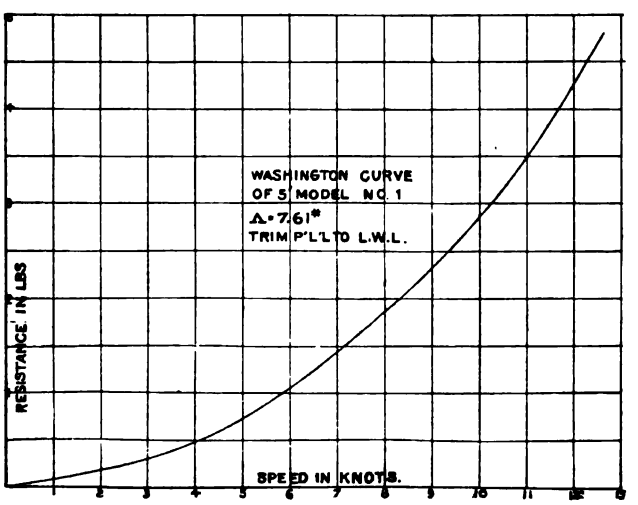
Sheet No. 2



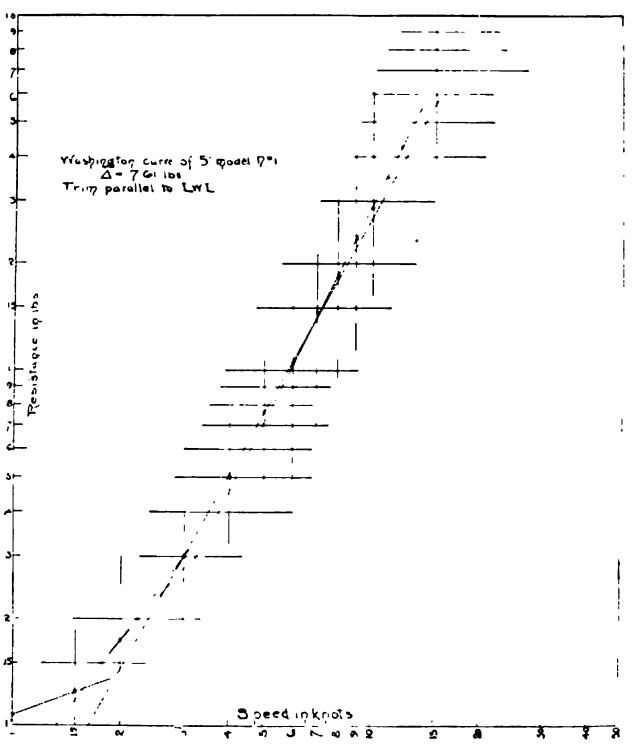
Curve Sheet No. 6

subject, but the phenomenon does not seem to be well understood. The case is probably analogous to the case of a skipping stone; but about this point we are not sure. The boat probably has reached such a speed that the vertical component of the resistance, having assumed some magnitude, forces the boat out of the water a distance corresponding to the value of the vertical component. A theory often advanced is that in this region of rising, which is known as the critical speed, a film of air is introduced between the surface of the boat and the water and then we have the boat running on a cushion of air with much decreased resistance. The first one of the two above mentioned theories seems to be the most plausible, however, and with this rise it will be noted that the resistance at the point of the critical speed seemingly is reduced considerably. About this point the author is in doubt. No doubt there is a proportional drop in the resistance, that is, the tendency of the curve is to bend over; but whether we get a sudden drop is a point of considerable doubt. With the rise of the boat we should get a reduced wetted surface and hence a lower frictional resistance. As this forms a greater part of the resistance, the total resistance should drop. The point in doubt is whether this change takes place suddenly or is gradual in character. For some models the drop is sudden, in others gradual, and in others not noted at all. This boat is just in between the two extremes, and from the results of the experiments it would seem as if there was a rather sharp bending over of the curve but not the abrupt drop.

We have a different phenomenon occurring in model No. 1. Lines on sheet No. 2, curve on curve sheet No. 2, photograph No. 2 on plate No. 7. It will be seen from the lines that the outer water body has the same general characteristics as the standard model. However, the underwater body is quite different. The keel is straight to about amidships and then gradually runs up so that there is just a slight draught at the stern. It is noticeable also that this model has little plane surface at the bottom, only a little at the stern, and that she is rather narrow on the water-line as compared with the standard model aft of the midship section. The design of the boat plays a large part in the character of the resistance for high speed. This is shown to advantage on the resistance curve of the 5-foot model



Curve Sheet No. 2



Curve Sheet No. 9

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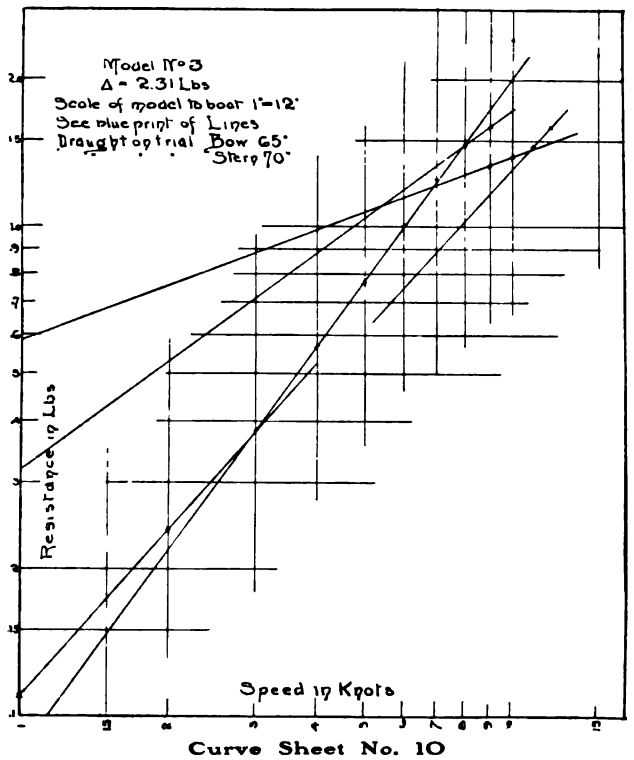
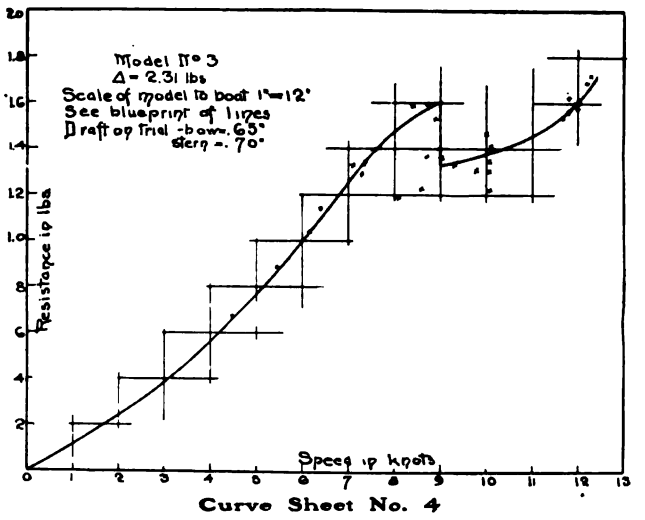
but better on the 3-foot model curve. This is given on curve sheet No. 6.

The character of the curve is similar to that of the standard for the lower speed, the percentage rise being about the same in both cases. This is seen best from the curve plotted on curve sheet No. 9. A better comparison of the two models will be found from the result of the tests on the 3-foot models. The curve for the 3-foot model of the standard will be found on curve sheet No. 7. We get in both cases a region of instability about at a speed of 8 knots. The region of instability is marked by a wide scattering of the points. Model No. 1 on trial showed a general instability from a speed of 6 knots up. From the character of the form of the boat, if she were heeled a little, it will be seen that she would offer more plane surface to the water than if she were kept on even keel; that is, for the lower speeds before she had taken a very decided trim by the stern if she were heeled a little she would have a tendency to plane on the surface presented to the water more readily than if she were kept on even keel. This is exactly what happened. When the boat was kept on even keel she showed a higher resistance for the same speed than when allowed to take her own course and heel either to port or starboard. The phenomenon of heeling was noticed both on the 5-foot and 3-foot models. At a speed of 8.5 knots the forward part of the keel of the model was running well out of the water, so that the surface which would be effective at lower speeds had become ineffective and the model planed on the flat bottom aft and ran on a straight keel. By reference to the curve we see that the curve is well defined above this period of instability and the model was by observation seen to be in a much more stable state than for a speed in the region of 8 knots.

As to the wave formation and trim. This model began to trim by the stern in the region of 6 knots and the bow wave was similar to the one thrown by the standard model at this speed, but as the velocity was increased the model trimmed more and more by the stern until about one-half of her keel was running out of the water. The wave in the region of 8 knots had a tendency to follow the curve of the boat, that is the tumble home and finally to lodge in the stern. As the speed went up the wave had more of a tendency to flatten out and its height to rise very rapidly until at a speed of about 12.5 knots (not plotted in the curve) the wave was approximately two feet in height. This height was not accurately measured, but this represents a fairly close approximation. At the very higher speeds the tendency of the model was to trim more and more by the stern and for the bow wave to become higher and higher.



Curve Sheet No. 10



Curve Sheet No. 4

Comparing the resistance of this model with the standard as to quantity we find that the resistance for model No. 1 is less for the lower speeds and greater for the higher. This is as would be expected, as the standard model has a greater wetted surface and the plane bottom does not become an important factor in the resistance until the higher speeds are reached. We see also that the curve of this boat has a tendency to straighten out but not to reverse its curvature. Therefore, we can say that the standard is the better boat for higher speeds; model No. 1 a better one for low speeds.

We have now to examine the different kinds of boat. Model No. 3, lines on sheet No. 4 and 4a, curve on curve sheet No. 4 and photograph No. 3 on plate No. 7. This boat is commonly known as the step hydroplane. By reference to the lines we see that for one-half of her length forward the V section is employed while aft of the step we have the regular plane section. This boat is very wide for her length and of a rather extraordinary form. It was the idea of the designer that the forward part of the boat would embody the advantages of the regular form of vessel; that is, it would go through a sea without pounding badly and that in the after portion we would get the advantages of the plane bottom and proportional decrease in the resistance at the higher speed. The curve for this boat is found on curve sheet No. 4 and the curve plotted on log paper on curve sheet No. 10. The slope of the curve of this boat is much steeper than those of the models previously examined, also it shows a greater resistance for the same speed than the other two; this was probably caused by the greater corresponding displacement and greater wetted surface.

This model on trial seemed to be very stable, prob-

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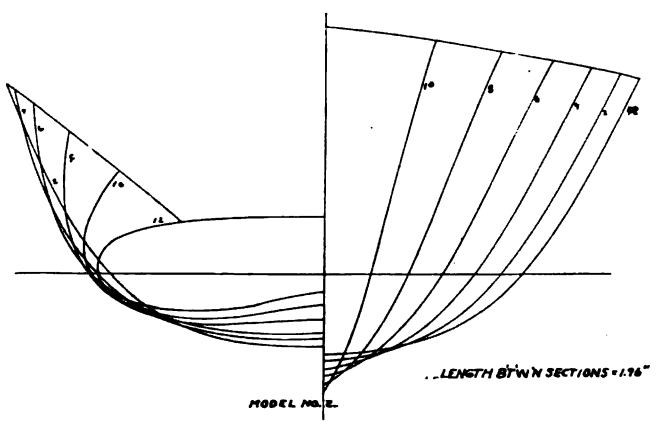
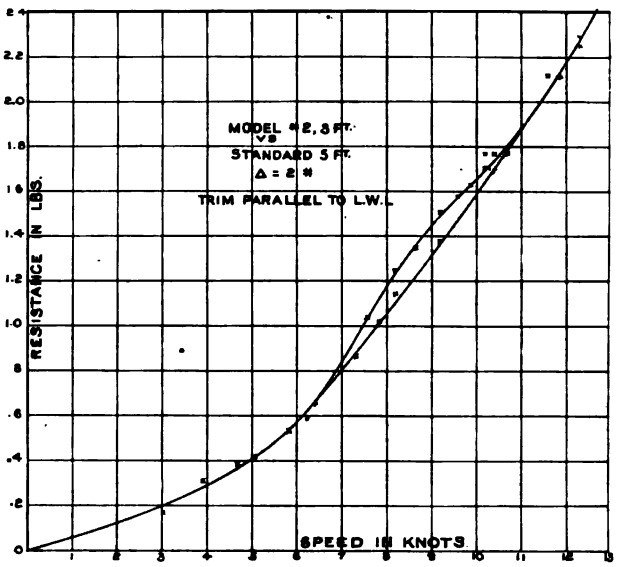
ably due to the large expanse of area aft, but proved to be a very wet boat, necessitating bailing after each run for speeds above 5 knots. The wave formation at the lower speeds was very peculiar. There were four distinct sets, one from the bow, one from the terminations of the forward sections, one from the beginning of the after sections, and another series at the stern. As the speed was increased, all of the waves except the bow wave were obliterated and this one had the characteristic feature of submerging the stern. At about a speed of 9 knots the boat lifted bodily so that she seemed to be resting on the after part of the forward body and upon the after part of the after body, the body between the step and a considerable distance back was not in contact with the water at all; this was caused by the excessive speed and the water not having time to fill up this portion of the trough made by the model in passing through the water. The gradual decrease in the slope of the curve is well shown and also the sudden drop corresponding to the rise of the model. The trim was first by the stern, which increased slightly as the speed increased until about 9 knots, when the boat rose and trimmed slightly by the bow. This is what was noticed in the case of the standard model at the critical speed. This type of boat can hardly be called a success and the curve and performance is given simply to illustrate the sudden drop in resistance, and also because several boats have been built along just these lines and have shown great speed with but little power. These boats, however, have been of very short length and with their excessive speed they tend to jump from wave to wave, which results in severe pounding, and which in time tends to disrupt the structure and the boat fails on this account. Another point to be noticed on the resistance curve of this model is that the resistance tends to rise very rapidly after the critical speed is once passed, and it is doubtful whether any great gain has been made in getting a seemingly large drop at the critical speed because of the great increase after the critical speed has been passed.



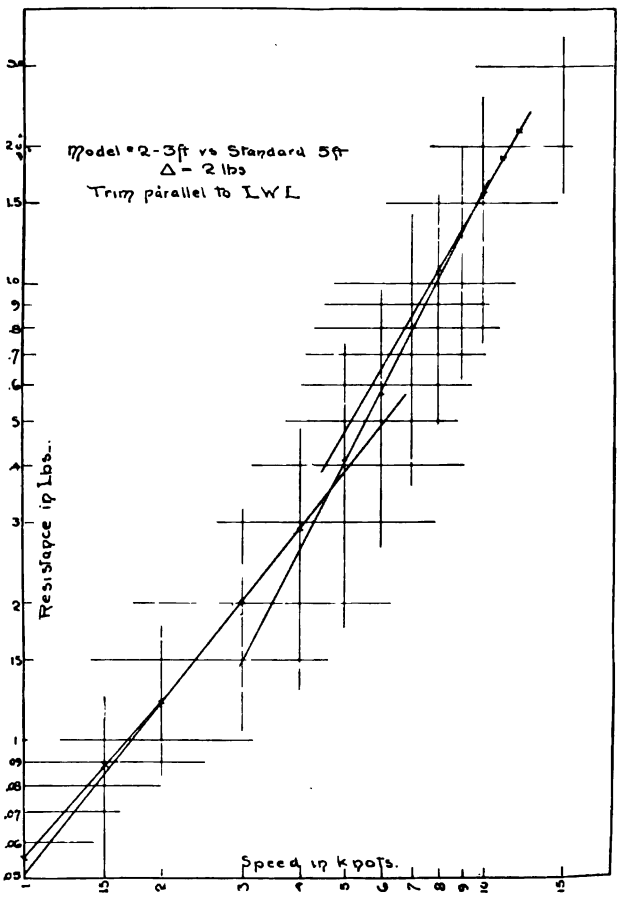
Sheet No. 5

We now have one more type of boat to investigate. Model No. 2, lines on sheet No. 5, resistance curve on curve sheet No. 5, photograph No. 2 on plate No. 8. This boat was called by her designer a cruiser, but she can hardly be called a cruiser as far as the name is meant to apply as regards power boats. Cruisers are usually meant to mean power boats having the usual type of form common to larger boats and yachts, that is, with fine bows and sterns. However, there are some



Curve Sheet No. 5

features of this boat which are well worth investigating. By reference to the lines it will be seen that she is flared for nearly the whole of her length but tumbles home aft. The underwater body is somewhat peculiar, being a wedge far forward and running into circular section and then concave aftermost sections. This concavity was probably made to make room for the propeller, so as to provide a tunnel for the flow of the water to the propeller, and not with the idea that it had any especial advantages as to resistance.



Curve Sheet No. 28

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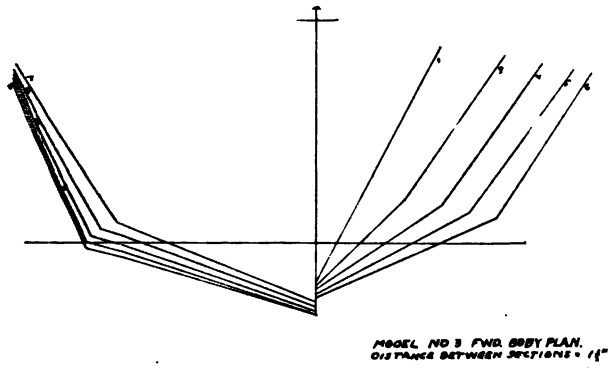
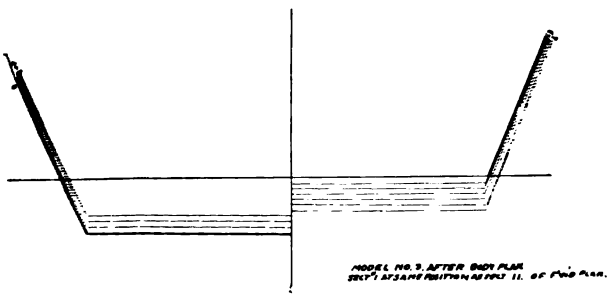
This model on trial proved to be a very dry and smooth-running boat. The change in the trim, the magnitude of the bow wave and the instability were not excessive, and above all this was the only model tried which was perfectly dry at the very high speeds, except one model which is so different from this one that they cannot well be compared. This feature of the boat may be explained by the excessive flare given to the outer water body and by the fact that the coefficient of the after water plane is in the neighborhood of unity. This model shows no well-defined critical speed but did show a general period of instability as shown on the resistance curve. Comparing this model with model No. 1, we see that we get an almost exact reproduction of the resistance curve for the two boats. This model had a greater wetted surface than model No. 1, hence greater frictional resistance. She showed less wave-making resistance, however, these differences tending to balance each other. The curved after sections of this model are not conclusive to planing action, which probably caused the resistance to continue to rise rapidly. This would make an ideal type of boat where the ratio of $\frac{V}{\sqrt{L}}$ is not over 4.

On plate No. 7, model No. 4 is shown. Neither the resistance curve or the performance offered anything new. This boat has the regular rounded sections forward while the sections aft are similar to the ones of the standard model. The bow wave thrown by this model is excessive and also has a tendency to submerge the stern. Model No. 3 on plate No. 8 might show some feature; the water-line at rest is a perfect wedge from the bow to the stern. The stern being the widest part. This boat was very smooth running and shows little wave-making resistance; she is very unstable, however, and totally unfit for the higher speeds.

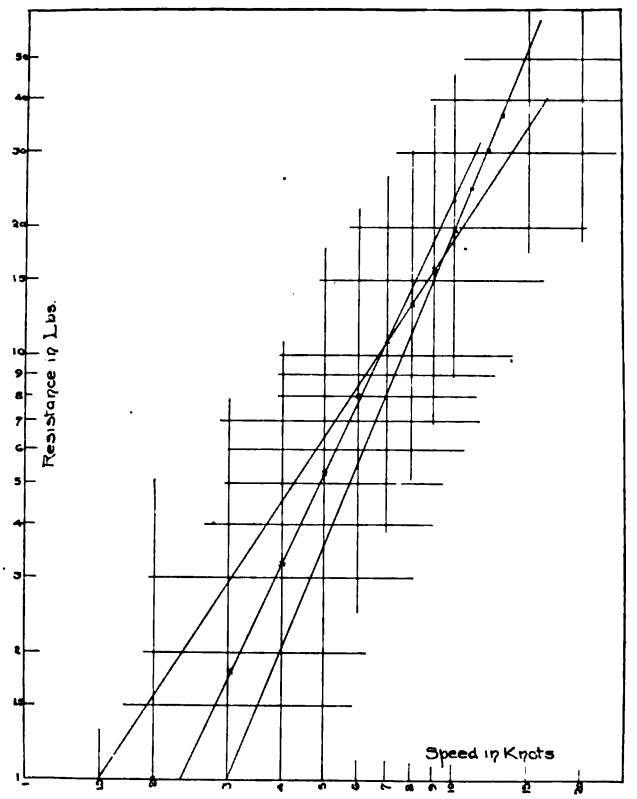


Sheet No. 4



Sheet No. 4a

Another boat with perfectly square sections was also tried, and the author regrets that the resistance curve can not be given here; because of lack of time this could not be determined with accuracy. Trials, however, showed this type of boat to be a much smoother-running model than any of the others previously tried. From other sources of information we find that for the higher speeds this type of boat shows from one-half to one-third less resistance than for the regular rounded sections. All of the indications for minimum resistance point to the adoption of this form of underwater body and the test showed this to be true. This type of boat is dry; does not show excessive trim, and is stable at all speeds. There is, however, one drawback, and that is that with high speeds this boat will have a tendency to jump from wave to wave, and this might cause serious damage to the hull; outside this bad feature a boat made along these lines would be ideal in every particular.



Curve Sheet No. 11

Curve 11 is the resistance curve of a speed launch tried in the Washington tank and is plotted to show the change in the slope with the increase of speed.

Some general principles may here be laid down as guides to be followed in the design of boats running at high speed. By high speed is meant where the ratio of $\frac{V}{\sqrt{L}}$ is above 4. For the regular boat form first, we must have sufficient supporting area aft to make the boat stable; that is, the coefficient of the after water plane must be in the neighborhood of unity. It is better if this supporting area is flat instead of circular in section. The outer water body must be flared for a greater part of the length; this will make the boat dry, and boats having a plane aft must be trimmed at rest by the stern to prevent floundering caused by the toppling over on top of the bow wave.

We have seen that planes are to be considered for high-speed power boats and we will develop the theory connected with same. This part of the resistance does not enter in as far as the regular form of boat is con-

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cerned and was therefore neglected under the general discussion of resistance. On the basis of Raleigh's treatment we have the following:

R = the total resistance in pounds.
W = weight lifted.
A = supporting plane area.
P = the normal pressure = w sec. θ.
F_1 = frictional resistance of plane = $fAV^{1.825}$.
F = the horizontal component of $F_1 = fAV^{1.825} \cos.^{1.825}$ sine θ.
V = the speed of advance.
V_1 = the speed in the direction of the plane = V cos. θ.

Then $R = W \tan. \theta + F = W \tan. \theta + fAV^{1.825} \cos.^{2.825} \theta$ (1)

According to Raleigh $P = \frac{A V^2 \sin \theta}{1.026(.223 + .175 \sin \theta}$ but $P = W \sec. \theta$,

Hence $A = \frac{W \sec. \theta (.229 + .179 \sin \theta).}{V^2 \sin \theta}$ (2)

Substituting (2) in (1) we have $R =$

$$W \tan. \theta + \frac{Wf \sec. \theta(.229 + .179 \sin \theta) V^{1.825} \cos.^{2.825} \theta}{V^2 \sin \theta}$$

$$= W \left[\tan. \theta + \frac{f(.229 \cot. \theta \cos.^{.825} \theta + .179 \cos.^{1.825})}{V^{.175}}\right]$$

The two above formulæ are for large angles. For small angles cosine θ and sec. θ equal approximately 1.

Therefore, for small angles we may write

$$A = \frac{W(.229 + .179 \sin \theta)}{V^2 \sin \theta}$$

and $$R = W\left[\tan. \theta + \frac{f(.229 \cot. \theta + .179]}{V^{.175}}\right]$$

By similar course of reasoning R. E. Froude found for small angles that $A = \frac{.4544\ W}{V^2 \sin \theta}$

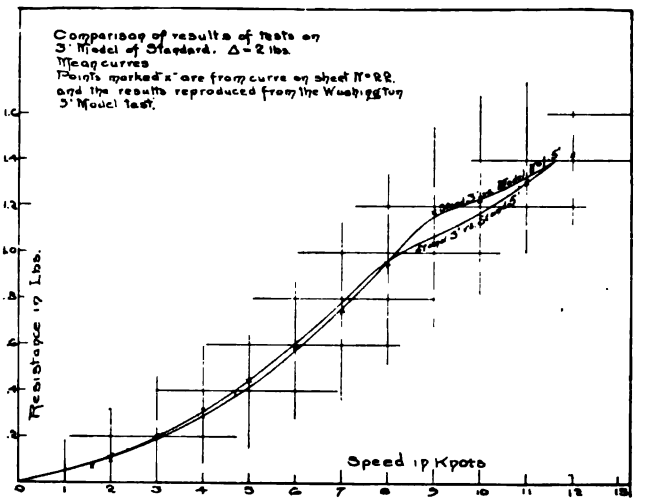
$$R = W\left(\tan. \theta + \frac{.4544 \cot. \theta)}{V^{.175}}\right)$$

Suppose we take the case of the standard 5-foot model and see how the results of our experiment compare with this fundamental theory. It is necessary to make certain assumptions which are only approximately correct. We will assume $\theta = 3°$, W = ½ the weight of the boat or 4.625 lb, A = area of the wetted surface = 2.93 × 70% = 2.05, assuming 70% of the wetted surface effective as a plane. V is equal to 13.2 knots, then according to Raleigh we find

$$A = \frac{4.625\ (.229 + 1.79 \times .05234)}{13.2^2 \times .05234} = .165 \text{ square feet}$$

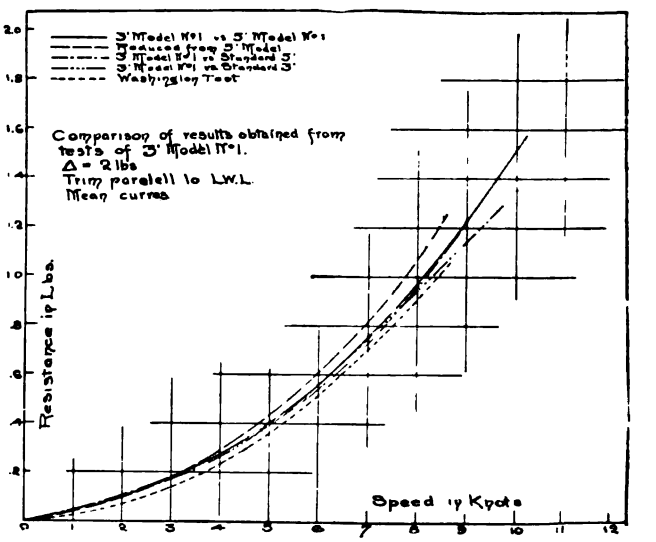
Assuming one-half of the underwater body out of water we have that A for the boat equals 2.05 × .5 = 1.025 square feet. From the formula we get that A = .165 square feet. The results do not compare very closely, probably due to the quantities assumed.

What we get from experimental results which seems to be borne out in practice is that for minimum resistance the angle θ should be in the neighborhood of 2½° or one in 21 or 22. Models of boats have been made and tried with this angle of trim and found to have less resistance than at any other angle. These tests were made with models having a plane bottom.


Comparison of results of tests on
3' Model of Standard. Δ = 2 lbs.
Mean curves
Points marked "x" are from curve on sheet N°22.
and the results reproduced from the Washington
3' Model test.
Resistance in Lbs.
Speed in Knots

Curve Sheet No. 12

On curve sheet No. 12 will be found the resistance curve of the standard model gotten by three different methods: first, reduced from the results of the dynamometer tests of a 5-foot model; second, 3-foot model compared with 5-foot standard using Colonel English's method; and third, 3-foot model against 5-foot model No. 1, using the same method. It will be seen that the curves compare very well and seemingly follow the law of comparison and the formula for frictional resistance up to the critical speed. *After this point is passed it looks as if the resistance would vary directly as the mass at corresponding speeds,* and a curve is so plotted making these assumptions. The curve as gotten from Washington did not have the points plotted, but the author was present when this boat was tried and he remembers that in the region of the critical speed the points were similar to the points gotten in the case of our experiments. If the curve is not made to drop off suddenly but an average curve drawn through the points and the resistance assumed to vary as the mass at corresponding speeds, the resistance would probably compare very closely with our results. Then we can say that these boats follow the laws *of comparison up to the beginning of their critical speed, the proper correction being made for frictional resistance,*


3' Model N°1 vs 5' Model N°1
Measured from 3' Model
3' Model N°1 vs Standard 5'
3' Model N°1 vs Standard 5'
Washington Test
Comparison of results obtained from
tests of 3' Model N°1.
Δ = 2 lbs
Trim parallel to L.W.L.
Mean curves
Resistance in Lbs.
Speed in Knots

Curve Sheet No. 13

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and that after and in the region of the critical speed they follow the laws of comparison direct.

In curve No. 13 may be found the comparison of the tests on 3-foot model No. 1. It will be seen that the curves compare fairly well, but a better comparison is due to several causes, which will be given later.

If we look back it will be found that we have covered most of the field in the matter of resistance as applied to power boats. There are, however, many more experiments to be done; that is, we must have further proof that the resistance will vary directly as the mass at corresponding speeds for speeds above the critical speed; we must find some means of steadying the boats in passing the critical speed and its effect on resistance. There are several interesting experiments to be performed but this is a little outside the work of this thesis.

(To be Continued)

VIPER

BELOW I shall answer as briefly as possible Mr. E. N. Bray's questions regarding Viper in the June RUDDER.

1. The weights of the various engines we used in Viper I and II were given in the first installment of my article, in THE RUDDER for March. Quoting from that article the engines were as follows: "a 3-h.p. four-stroke, heavy-duty engine, weighing 300 lb; a 7-h.p., two-stroke, high-speed engine, weighing 275 lb; a 12-h.p., two-stroke, high-speed engine, weighing 355 lb, and a 30-h.p., two-stroke, high-speed engine, weighing 500 lb."

It is well to repeat these weights here, as the three last may serve as some sort of guide to the many amateurs who are building Vipers. It is, for instance, not well to install in a 20-foot Viper a 30-h.p. engine that weighs much more than 500 or 600 lb, and expect to get the best results out of the boat. That is, a 20-foot Viper to be driven to the best advantage by a 30-h.p. engine should not weigh more than about 1,400 lb in racing trim. This is based on our experience with Viper II.

A fair number of the letters I have received showed that the prospective builders have a tendency to overlook the importance of reasonably light weight either in hull or engine. In the April RUDDER I said: "Lightness will add to the speed of any type of boat, but, within reasonable limits, it will add less to the speed of a Viper than perhaps any other form." In a recent letter Mr. Bacon, of the Bath Marine Construction Company, confirms this statement from experience with their own Vipers. He says: "Weight does not seem to affect the speed of this boat as much as it does other speed models."

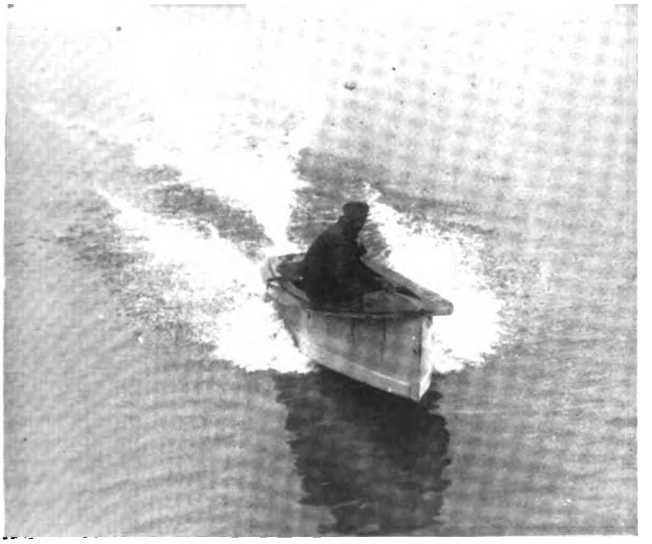

Photo of Viper at Speed when Overloaded for Her Power

But speed is not the only consideration. For a Viper to be a comfortable and seaworthy craft she must run in her proper trim, and this is of more importance at high speed than at low. But, as has been pointed out in the earlier articles, if she is overloaded for her power she will not run in her proper trim, but will rise too much by the bow, settle by the stern and show a "trident" wake, somewhat like the round-bilged racers of similar length. She still remains faster than the round-bilged craft of the same length, weight and power, but the tendency would be for her to pound in a chop. That is, she "Yarrow-Napiers."

The photograph illustrates this condition very well. It is a picture of Viper II with the 30-h.p. engine installed. The engine was working badly and there was a good deal of water aboard from a leaky rudder-port. The boat was running at probably from 22 to 22½ miles at the time the picture was taken, and though the exhibition was not as bad as at 20 or 21 miles, it was bad enough. It shows pretty well every fault these boats will develop when overloaded for their power. On the other hand, at 25 miles these defects cleared up.

There is no reason that I have seen why a 20-foot Viper should not carry an engine weighing 1,000 lb providing that it turns out power proportionate to its weight. The determination of the weight of an engine to be used in any particular case boils down to the employment of some formula that will consider available bottom area, power of engine and total weight of engine and hull, and which can only be evolved by experiment. In actual practice, as engines go in these days, perhaps a 20-foot Viper should not be powered with a machine weighing over 500 or 600 lb, which will leave a good margin for a hull of reasonable strength.

2. *Exact position of engine in boat.* I purposely made no attempt to give this, as it must vary with each type of engine, as well as with every type of construction of boat and of engine installation. The position of shaft and the shaft angle are constant. Every builder will try to place his engine as low in the boat as is possible. With a crew and other weight that can be shifted about, the exact position of the center of gravity of the engine is unimportant.

3. Concerning the position of the air-plates the same thing may be said. I described them as coming out to the sides of the boat 18 inches or so forward of the line where the bottom normally meets smooth water. This line will vary somewhat with different powers, and the position of the plates should be varied accordingly.

4. The spray-boards are important in choppy or rough water at all speeds. These also were shown in one of the photographs in the March RUDDER. The spray boards shown in the design published in the May RUDDER are, I should say, in excellent proportion for use with any power.

ALBERT HICKMAN.

* * *

We believe Mr. Hickman's observations regarding the proper trim of Viper to be absolutely correct as we had the same experience with a craft built from the lines.

[EDITOR.]

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A WEEK-END CRUISE IN NEW ZEALAND WATERS

IN a former article published in the March (1909) number, Auckland has been spoken of as the yachtsman's paradise, and very justly so, as in no part of the British dominions can the yachtsman get a more varied change of scene for his week-end cruise than in Auckland. Let us suppose that the owner of the yacht M. leaves off business at 12 noon, and resides at Devonport, the Brighton of Auckland. He will get the ferry steamer leaving the city, at 12:20, which will land him at the Victoria Wharf, Devonport, about 12:35 p. m. He proceeds home, has his lunch, and by 2 p. m. his crew, provisions, etc., are aboard and he is ready to cast off his moorings, bound for one of the cruising grounds or rendezvous, particulars and pictures of which we give herewith. We shall suppose M. is bound for Awaroa Bay, which is situated on the southern shore of the island of Waihike, distant from Devonport about 15 miles; one of the many islands that stud the Hauraki Gulf. Awaroa Bay, or to give it the full name, Awa Awaroa Bay, the meaning of which is the "Long River," is a large indentation and is one of the largest bays in the island.

Recently the Northern Steamship Company, Limited, of Auckland, erected a fine wharf at Awaroa Bay for the convenience of tourists and excursionists, as Awaroa is becoming one of the popular places as a pleasure resort, the Northern Steamship Company running excursions there during the holidays. The only residents of Awaroa Bay are Mr. W. Gordon and family, who keep a large boarding-house which in Summer is always full of visitors, excursionists, etc. The Gordons are very friendly to the yachtsmen and are highly respected by the latter.

The deepest yacht can enter or leave Awaroa at all states of the tide and good shelter can be obtained here from a Westerly or a Southwesterly breeze, or from a Northeaster, as the land is very high on the sides of the

Scene on One of the Coves on Cowes Bay Waihike New Zealand

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View of Auckland Harbor, New Zealand

bay. Should the wind be Southerly when our craft has left her mooring she will have a lead to Awaroa, where the anchor will be dropped for the night. The evening is generally spent at the boarding-house or socially with some of the other yachts' crews, as it is an unusual thing to see only one yacht at Awaroa. There is plenty of shelter all the way from Devonport; if it comes on to blow from the West good shelter may be got under Motoihi, the Quaratine Station, or under Browns Island, the native name of which is Moto Korea. Shelter can also be got at Putiki Bay, Rocky Bay, or at Mataitai, the last-named being a very popular rendezvous. Deep water is obtainable in Rocky Bay, where fresh water can also be procured. Mr. J. H. Watson is one of the residents of Rocky Bay and a very genial English gentleman.

The passage is free from rocks, etc., the reef at Browns Island having a beacon and being buoyed.

Although there is a good rise and fall in the tides, a yacht can enter or leave any of the bays at any state of the tide. Cowes Bay is another favorite place. Here, too, there is a large boarding-house, kept by Mr. H. Insley, who is the district policeman for the island, or, as he is called, "special constable." The Northern Steamship Company erected a wharf at Cowes and as at Awaroa, there is a post-office and telephone bureau. The steamers call three times per week in the Summer and twice in the Winter. Cowes is not as large as Awaroa. An annual regatta is held at Cowes on January 1st, which is patronized largely by yachtsmen. There have been as many as 120 yachts and launches at anchor at Cowes on a New Year's Day. During the holidays the Northern Company's steamers bring hundreds of pleasure-seekers to Cowes. McLeods Bay, Commels Bay, Days Bay on the eastern end of Waihike, always get a large number of visiting yachts. Commels Bay has a store where the yachtsman can replenish his stores if required; fresh water can also be obtained.

Man-of-war Bay is another large and popular resort. Most of the land is owned by Mr. George Bruce, a Scotch gentleman and a worthy citizen. There are two houses on the portion of Man-of-war Bay where the wharf is, viz., Mr. Bruce's private house and that of his manager, Mr. John Williams, a native of Yorkshire, who, with his wife, is a very hospitable Englishman and is always pleased to see respectable yachtsmen.

Hooks Bay, on the northeast end of the island, is well known to yachtsmen. Mr. Hook always gives a hearty welcome to visitors.

Owanaki, Haroto, and Squadron Bays are popular places, but *the* bay of the lot is Mataitai (pronounced Ma-tea-tea), which is sheltered from nearly all winds. The natives (Maoris) used to live at Mataitai but have since gone to Owanaki and were very hospitable to visiting yachtsmen; so much so that the chief (George) Hori was invited to attend an annual presentation of prizes at the Ponsonby Cruising Club, an invitation which he accepted and at which he made a speech. There are numerous other cruising grounds but these are the best known on Waihike.

A very popular cruise for Easter, i. e., for the mullet boats or centerboard type of yacht, is Clevedon, on the Southern Wairoa River. The Wairoa South is an agricultural district; the township being named Clevedon. It is situated on the Wairoa River, a tidal stream distant from Auckland by rail about 27 miles, as the nearest railway station is Papakura, 19 miles from Auckland; then by coach to Clevedon about 7 miles, or by steamer direct from the wharf at Clevedon to Auckland. It is not so far by steamer as by railway.

The farmers in the Wairoa South are very hospitable to the yachtsmen and often make them presents of fruit, milk, etc. The river is very pretty at high water and winds in and out a good deal. The banks are very muddy, and fringed with mangroves. It is navigable for miles at high water, but many of the keel yachts do

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Racing in Auckland Harbor. In the Center of Photo is Mavourneen, on Which the Author Cruises

not go to Clevedon, although Spray, Maris, Speedwell and others have been up there. There are places where a keel yacht can lie afloat at low water. The Wairoa River is principally navigated by the centerboard type of yacht described before as the mullet boat.

The entrance to the Wairoa River is staked for the guidance of vessels that use it; but the master of keel crafts would do well not to attempt to enter the river without a local pilot or one of the crew who has been up there before, as he may go on the mud. There is quite a nice little township at Clevedon, consisting of an hotel, stores, etc.

Mototapu, the residence of the late Mr. James Reid, offers several very good bays to which a yachtman may cruise. The name Mototapu means the "Sacred Island." The late Mr. Reid was a Scotchman who was the soul of hospitality. Formerly there were two brothers, Messrs. John and James Reid. Mr. John Reid died while on a trip for the benefit of his health among the South Sea Islands. Both gentlemen were highly respected by the yachting fraternity.

Home Bay, Mrs. Reid's residence, is where the annual picnic of the Independent Order of Odd Fellows, Manchester Unity, is held, Mr. Reid having been a member of the Order during his lifetime. It is a very pretty bay, and the Devonport Steam Ferry Company, Limited, erected a wharf there for passengers. At the last Odd Fellows picnic in February, sixty-five yachts were at anchor in the bay. It is estimated that ten to twelve thousands people attended the Premier Picnic, as it is called, Sir Joseph G. Ward, Premier of New Zealand, a prominent member of the Order; Mr. W. F. Massey, M. P., and several other members of Parliament being present.

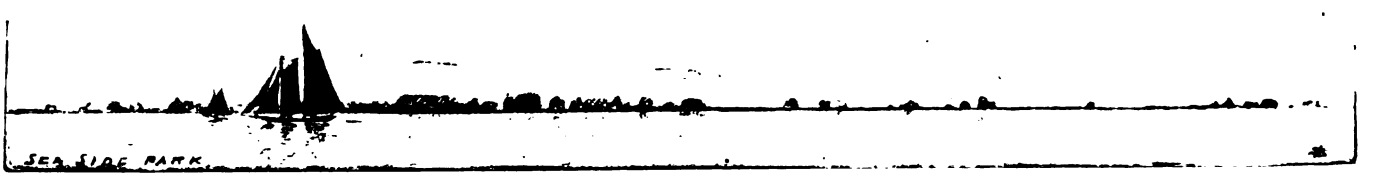
Station Bay is another nice place, as is also Drunken Bay, so called as it is the place where ships' compasses are adjusted. The bay abounds in shell-fish such as cockles, mussels and oysters, the last-named being protected by the Government. Drunken Bay is between the islands of Rangitoto and Mototapu; in fact, at low water it is possible to walk from one to the other.

Deer are plentiful on Mototapu, also rabbits; while Rangitoto has lots of opossums, wallahies, etc. Emu Bay, the late Mr. Reid's former residence, is a pretty spot, but is not much frequented by yachtsmen.

I have given a few of the places of resort where yachtsmen go for the week-end cruise; but what has become of our craft in which we left Devonport? She was anchored in Awaroa Bay when we left her.

On Sunday morning, if the weather is favorable, after the crew have had a bath and breakfast has been partaken of, sail is made and the anchor is weighed only to be dropped again when one of the fishing grounds is reached. The result of a few hours' fishing is usually a good catch of schnapper, kahwai, trevalli, etc., when all hands start to get the fish ready. Some of the crew will scale the fish while others will clean them and tie them up in bundles ready to be taken ashore. After dinner a start is made for home, the moorings usually being picked up about 5 p. m. When everything is made snug, sails covered, ropes coiled, decks washed, each of the crew takes what fish he wants and usually takes some to friends ashore, the members of the crew get into the dinghy, pull ashore, and after hauling up the dinghy thus ends the week-end cruise of the M.

J. COLLIS.



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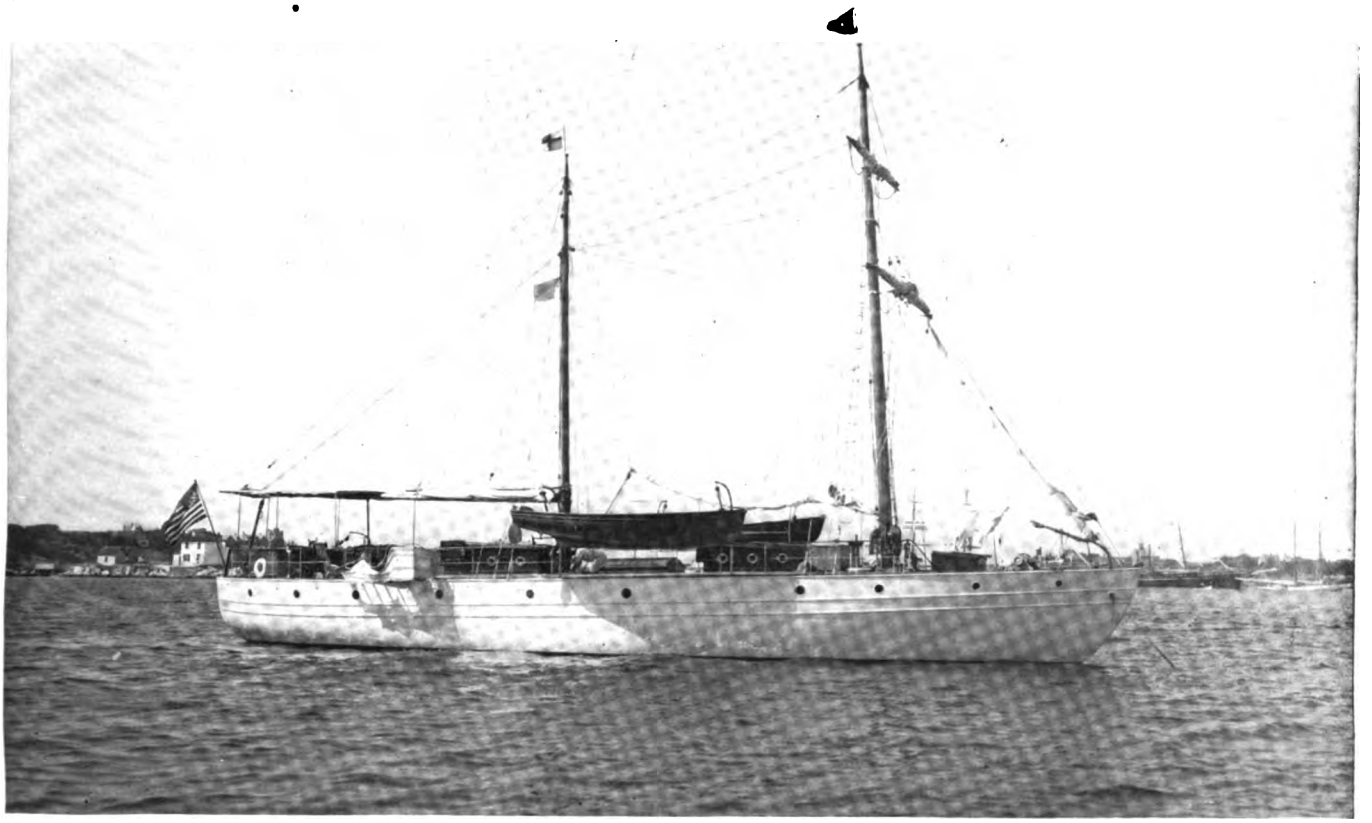
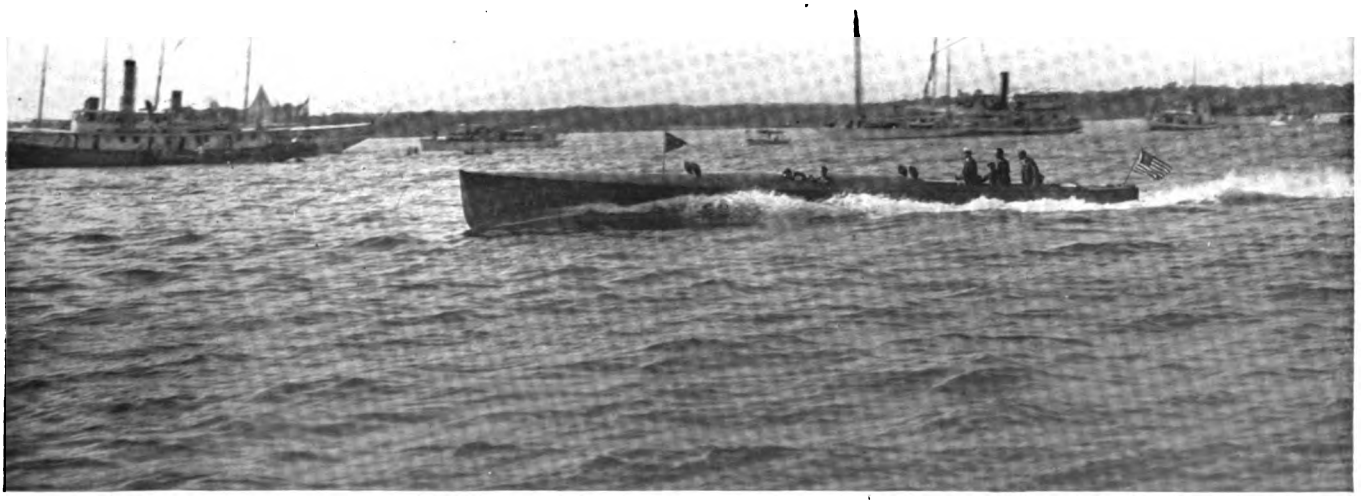


Sturdy, ex-Limit 69 Feet O. A., Globe Engine. Designed by Arthur Binney and Owned by Sylvester W. Labrot, Annapolis, Md.



Two Types of Power Craft Noticed at the International Cup Race at Larchmont, N. Y. Sturdy above, and Tartar, 60 Feet O. A., 12-Cylinder, 300-H.P. Speedway Engine. Designed and Built by Gas Engine & Power Co. and Chas. L. Seabury Co. Cons.

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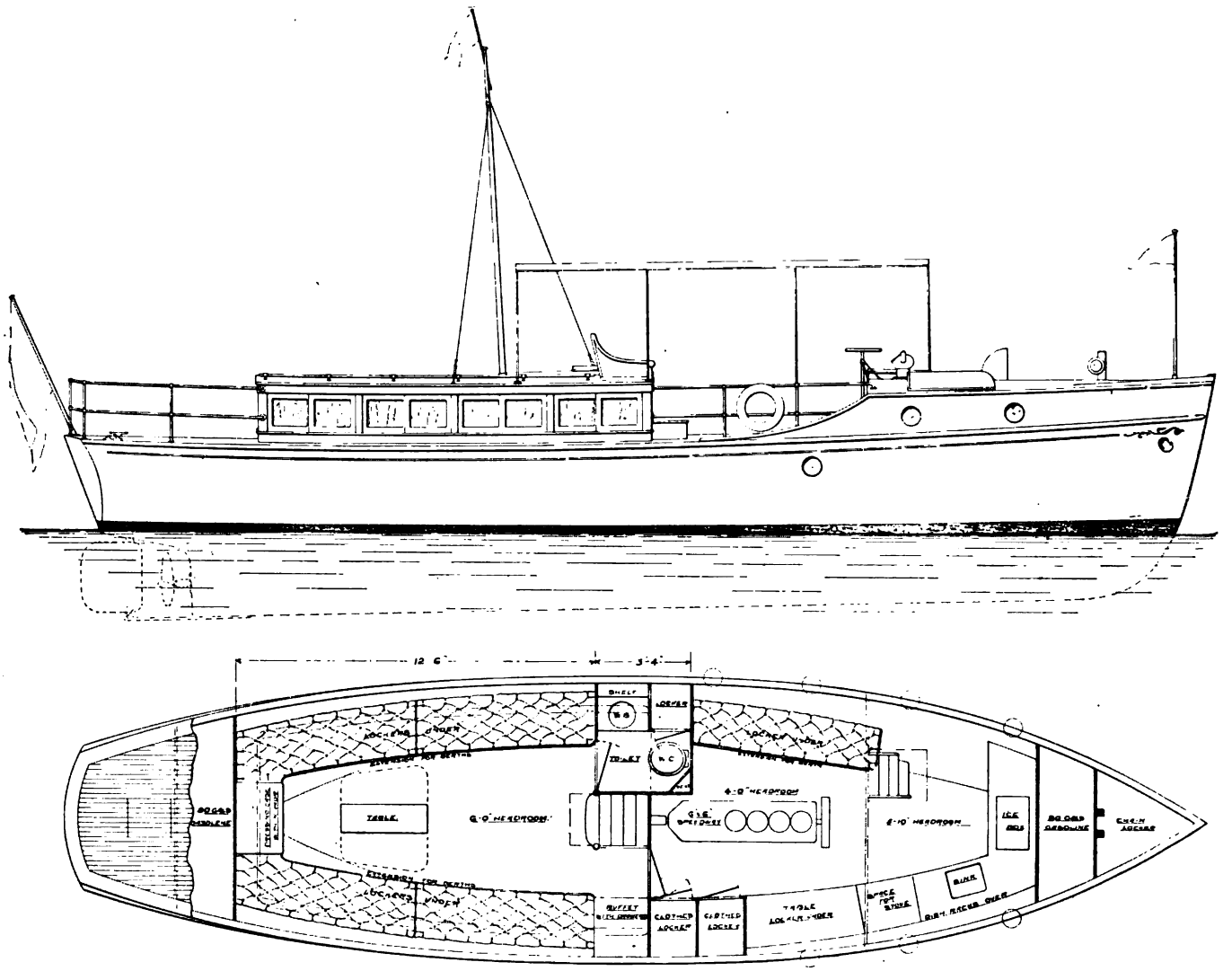

Forty-Foot Cruiser. Designed by H. W. Patterson, Milton Point, N. Y.

FORTY-FOOT CRUISER

THE 40-footer shown above was designed by H. W. Patterson, of the Milton Boat Works, Rye, N. Y., as a coast cruiser possessing the necessary seagoing abilities to compete in the Marblehead Race. As the owner desired a bridge forward, the engine was placed under same with an entrance to the main cabin aft as well as to the forecastle. Four good berths and 6 feet headroom is obtained in the after cabin together with a good-sized lavatory. Galley and ice-box are located forward and the fuel tanks divided up, one being in either end of the vessel.

The craft is substantially constructed and finished throughout in mahogany. The engine is a four-cylinder, four-stroke, 6 by 6-inch Speedway with jump-spark ignition. The total fuel capacity being about 170 gallons. The tanks are of copper and each located in a copper-lined compartment with a ⅜-inch lead drain pipe on each side, to drain any possible leakage, due to accident, overboard. The supply pipes are of copper and carried from tanks, outside the hull of the vessel, to a point immediately under the carbureter. The valves and strainers are fitted to the supply pipes inside of tanks with long stems leading up to the top. The whole making a very safe equipment.

THIRTY-FIVE-FOOT FAST CRUISER

THE 35-footer opposite was designed by Arthur P. Homer, of Boston, Mass., for his own use, and built by George Loring. Mr. Homer desired a high-speed cruiser with comfortable living accommodations for four people, and it was necessary to provide a heavily-built craft as it was the intention to cruise extensively along the New England coast.

The following scantlings give an idea of the structure of the craft. The keel is of 4½ by 10-inch white oak, frames 1½ inches square, clamps 7 by 2½-inch hard pine, with ⅞-inch planking of the same material. The interior finish throughout being of mahogany. The accommodation is clearly shown in the accompanying plan, the engine being a four-cylinder Sterling of 5½-inch bore and 6-inch stroke, equipped with Bosch ignition and turning a 24-inch Hyde turbine propeller of 30-inch pitch 800 r.p.m. The craft has a square stern with outside rudder, which arrangement seems to have met with favor this year, and in exterior appearance presents a well lined boat.

The general dimensions are:

Length o. a.....	35	feet	0	inches
Breadth, extreme.....	7	"	0	"
Draught	2	"	6	"

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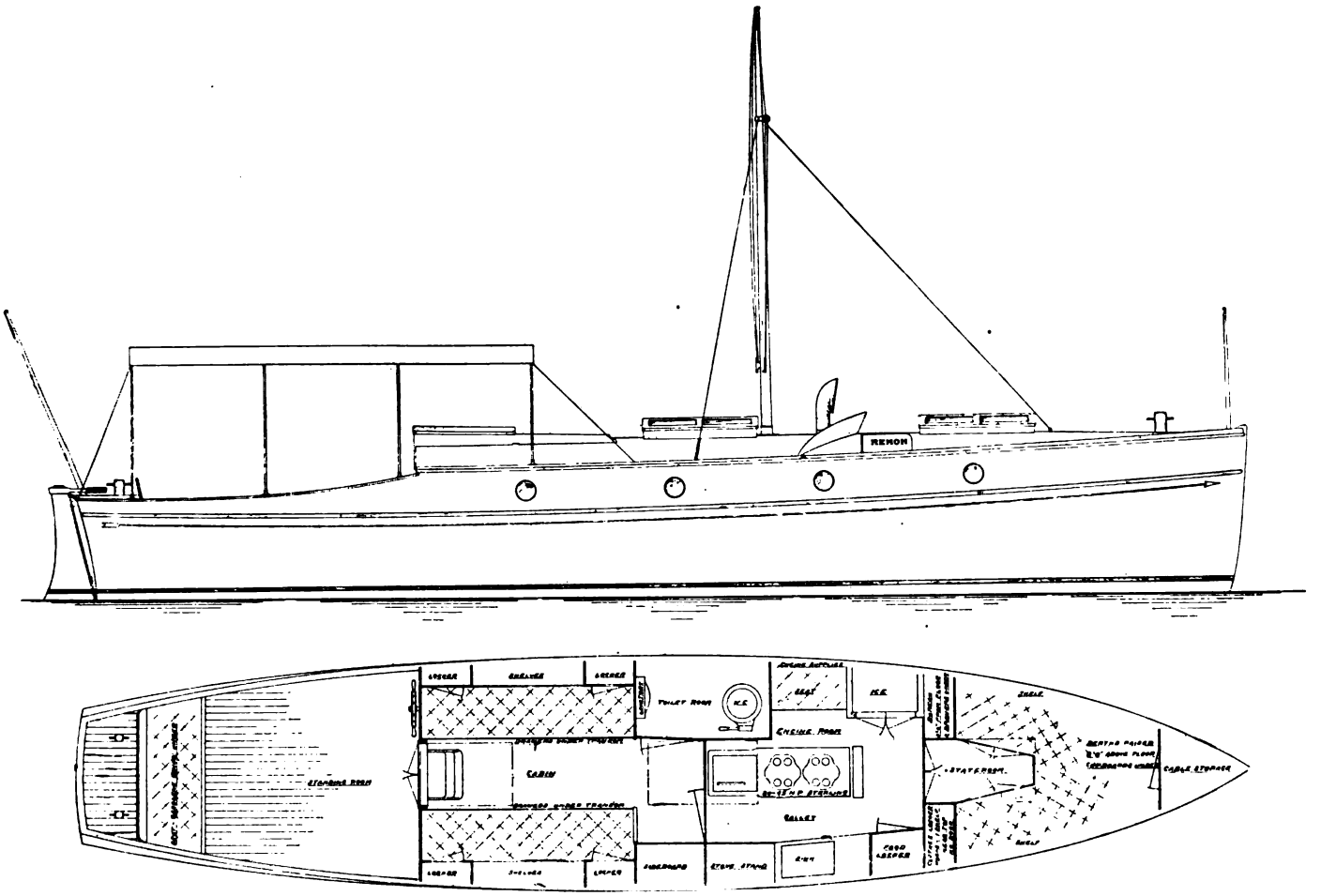
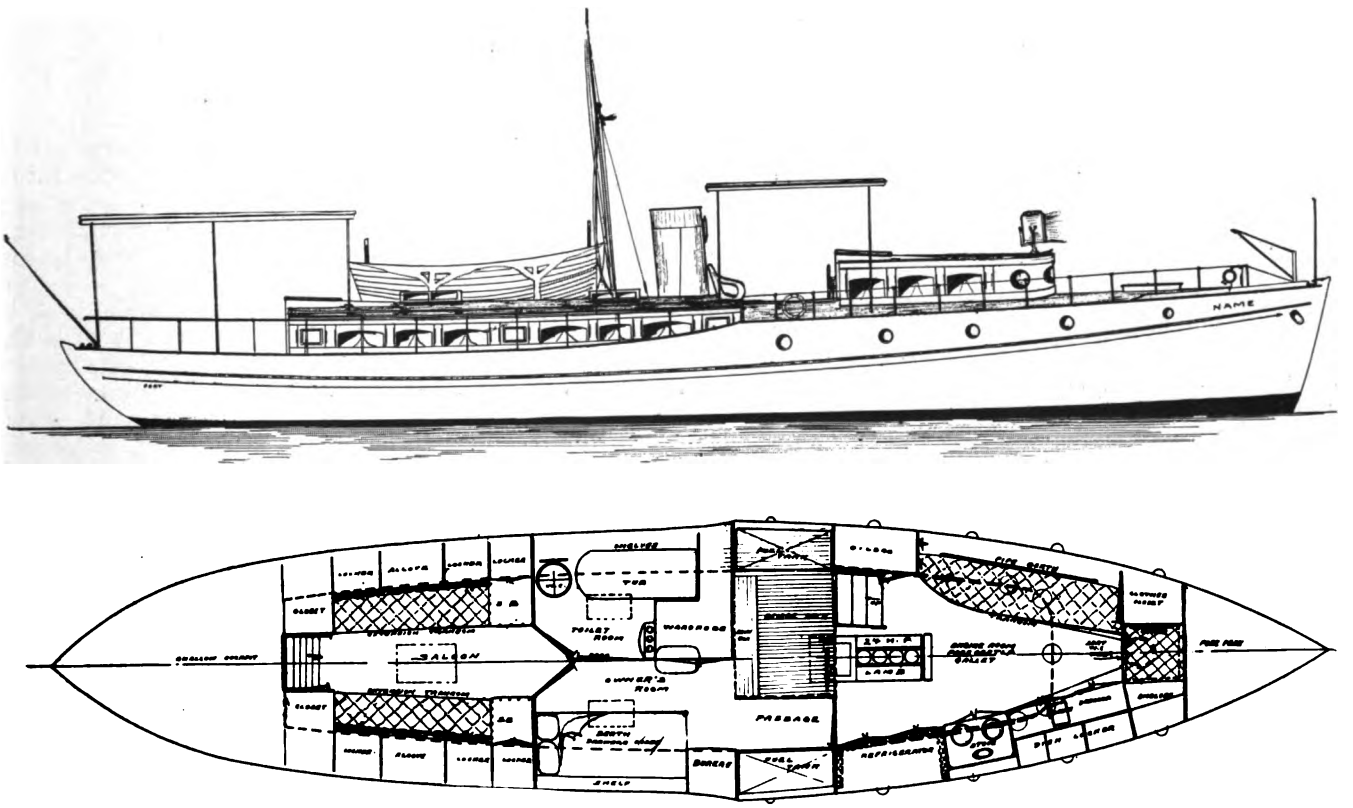


Thirty-Five-Footer. Designed by Arthur P. Homer, Boston, Mass.



Fifty-Foot Cruiser. Designed by Wm. J. Deed, Jr., Boston, Mass.

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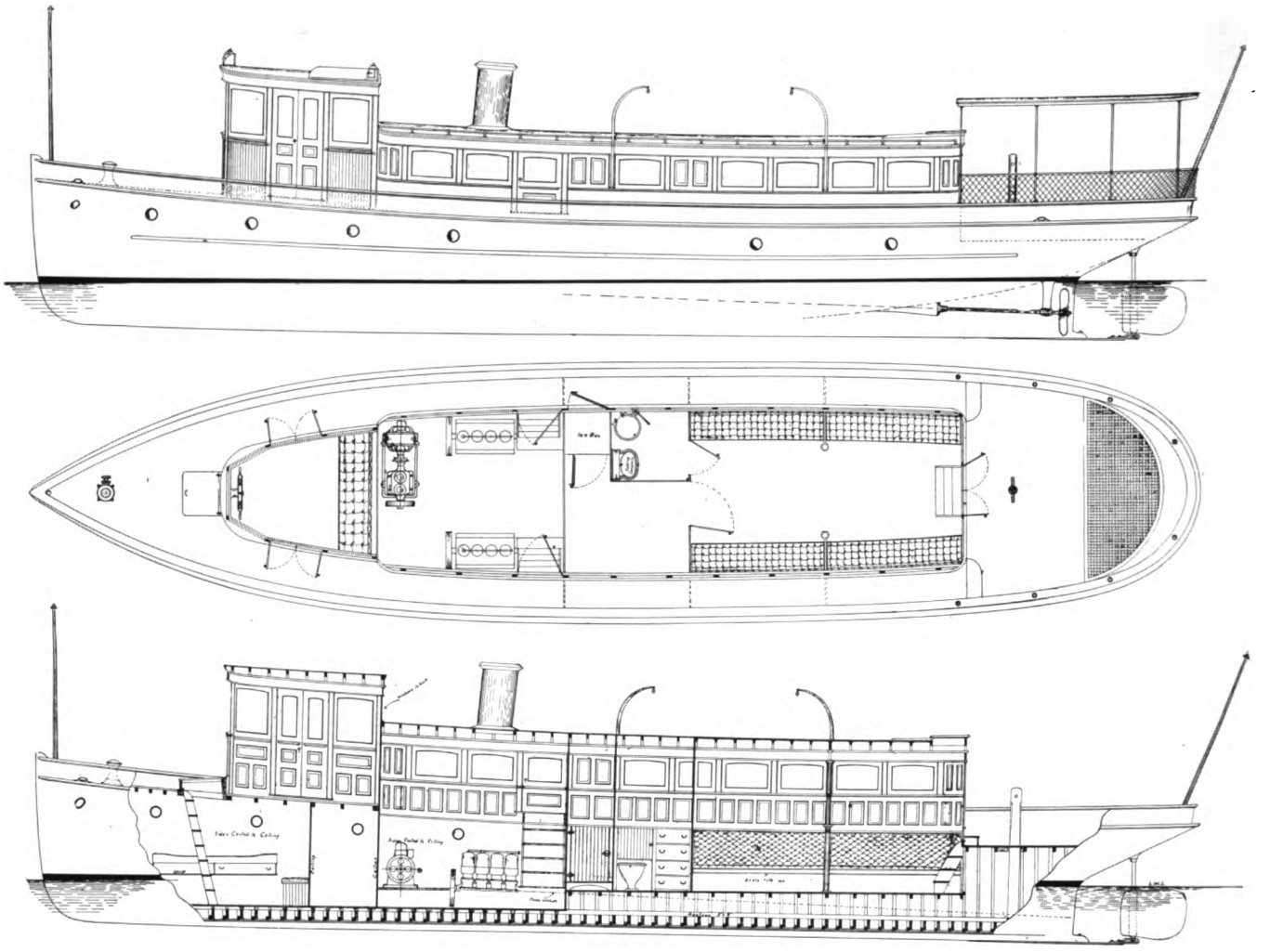

Illinois. Designed and Built by Jones & La Borde Oshkosh, Wis.

FIFTY-FOOT CRUISER

THE plan on previous page shows a 50-foot cruiser from the board of Wm. J. Deed, Jr., of Boston. The maximum of sleeping accommodation has not been sought in this boat, but, rather, a fair degree of elbow room for a limited number. The general plan is an engine room and forecastle forward, with galley in starboard. Here under the trunk erected on the turtle deck, is obtained full headroom, and the passage connecting this forecastle with the after accommodations also has full headroom.

On the port side of this passage sunk in the deck is a bridge with wheel, engine controls, and seat for guests. The fuel for the 24-h.p. engine is carried in two tanks alongside the bridge.

In the owner's room is shown a built-up berth with drawers under, a bureau and extra large wardrobe. From the owner's room one may go to any part of the boat without going on deck, a decided advantage in bad weather. The saloon is very prettily arranged with closets, lockers and alcoves with extensive transoms sleeping four. The cockpit is a shallow affair, which, well scuppered, will shed any sea which might come aboard. General dimensions are:

Length o. a.....	50	feet	6	inches
Breadth	4	"	0	"
Draught	3	"	6	"

ILLINOIS

THE above craft was designed and constructed by Jones & La Borde, of Oshkosh, Wis., for Mr. E. H. Fahrney, of Chicago, for use at his Summer home near Oshkosh. The craft was planned to be a staunch combination tug and cruiser, part of her duties being to tow Mr. Fahrney's 65-foot houseboat, Black Wolf.

The boat is 65 feet over all and has a breadth of 13 feet and draws 3 feet of water. The keel is of white oak 5½ by 6½ inches, frames 2 by 2¼ inches spaced 9 inches centers, keelson 4 by 6-inch white oak, planking below the water-line 1½-inch white oak, and above water-line 1⅜-inch spruce. The after cabin, stateroom, lavatory, and pilothouse are finished in mahogany. The crew's quarters are under the forward deck, finished in white enamel; the engine room and galley being finished in yellow pine. The craft is equipped with two four-cylinder, two-stroke Termaat & Monahan engines developing 50-h.p. each at 500 r.p.m. The fuel supply is 500 gallons and the feed is by pressure. The boat is equipped with electric lights, automatic electric-driven air compressors, generator set, storage batteries, and all the necessary equipment of an up-to-date yacht. The exhaust is lead into a large muffler in the stack which effectually silences the noise of the engines. The craft has a speed of 12 miles per hour and has given excellent service for the designed purpose.

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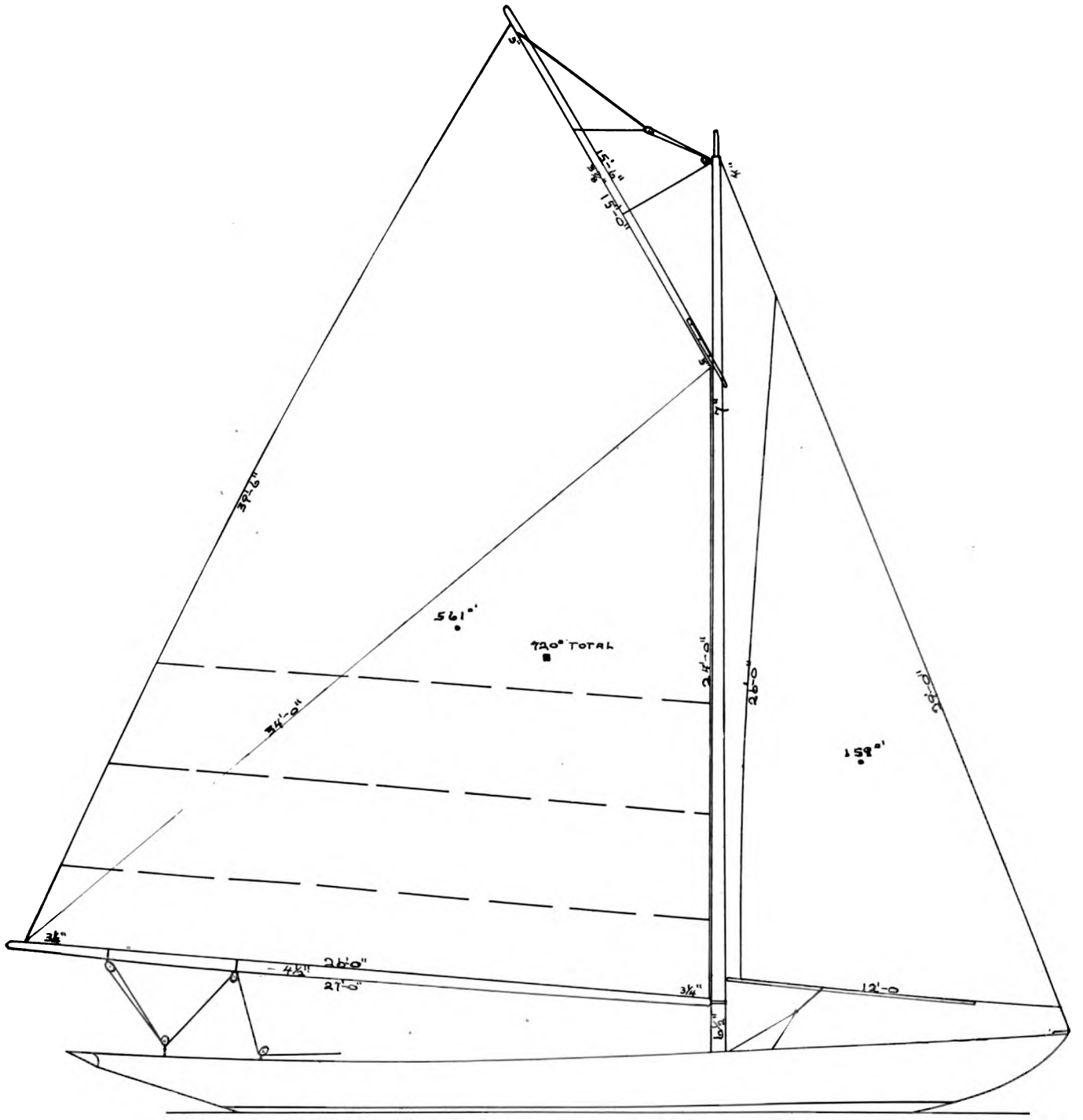

Alert, Class Q Boat. Designed by C. D. Callahan, San Pedro, Cal.

PACIFIC COAST CLASS Q BOAT

THE accompanying plans are of a Class Q boat, Alert, designed by C. D. Callahan, for John S. Edwards et al, of Santa Barbara, Cal., as the defending boat of the Santa Barbara Y. C. during the regatta of the South Coast yachts at Santa Barbara last month. The boat was built under the supervision of Mr. Callahan, who claims that she is the first Class Q boat to be built on the Pacific coast, the South Coast Y. C. being the first club to adopt the universal rule.

Her general dimensions are:

Length o. a.....	38	feet	0	inches
Length w. l.....	25	"	0	"
Breadth	8	"	6	"
Draught	5	"	9	"
Area				
Mainsail	561	square	feet	
Jib	159	"	"	
Total sail area.....	720	"	"	

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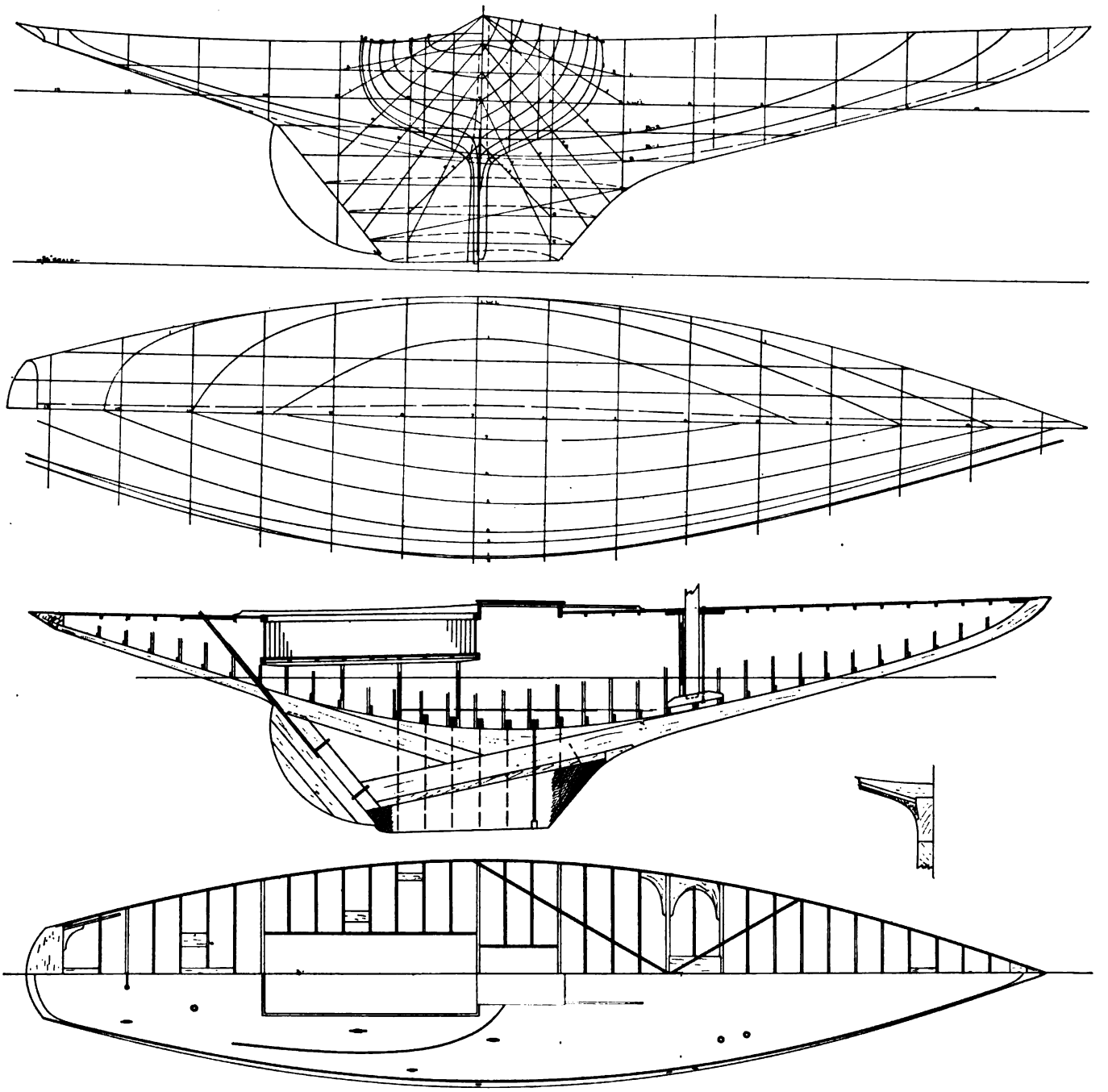

Lines and Construction Plans of Class Q Boat

FORTY-FIVE-FT. FREIGHT BOAT

THE inroads that are being made to-day by the gas engine for commercial purposes, are perhaps best illustrated by the large number of freight and passenger boats that are being built in all parts of the world.

The design which is shown opposite was made by Edson B. Schock for the purpose of carrying passengers and freight on a lake in India. The design will not appeal to the average man as one suitable for the passenger trade, but the Indians do not sit down when traveling but prefer to squat on deck. A large hatch was placed forward and any cargo which they might have is to be carried below.

The construction of the boat is of the very best, consisting of teak throughout. The pilothouse was placed aft and a low house built over the engine space, which not only protects the engine but furnishes sleeping quarters for the crew, which perhaps will never be occupied, as the crew as a rule sleep on deck.

The engine is a 30-h.p. Fay & Bowen convertible kerosene oil engine, which is expected, with the easy form of the boat, to give her a speed of 11 miles an hour or better.

The dimensions are:

Length o. a.....	45	feet	0	inches
Length w. l.....	40	"	0	"
Breadth, extreme	12	"	0	"
Draught, extreme.....	3	"	2	"

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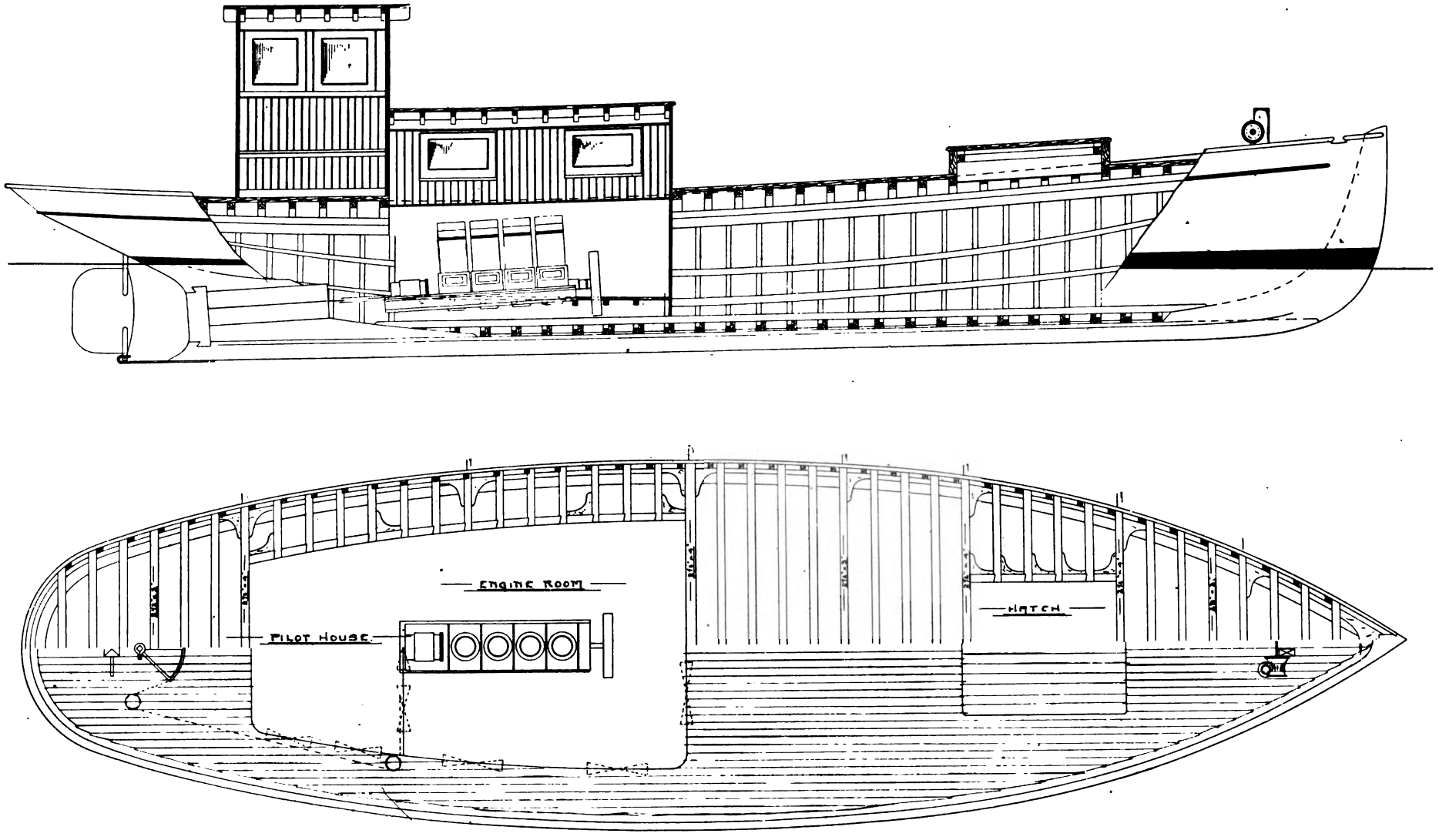

Forty-Five-Foot Freight Boat Designed by Edson B. Schock New York City

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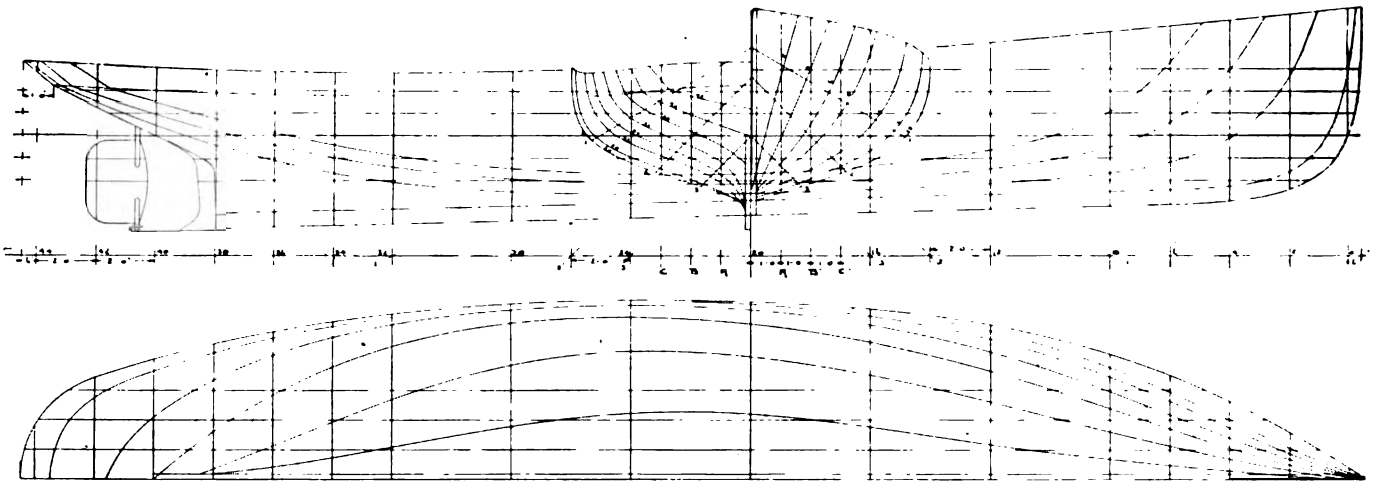
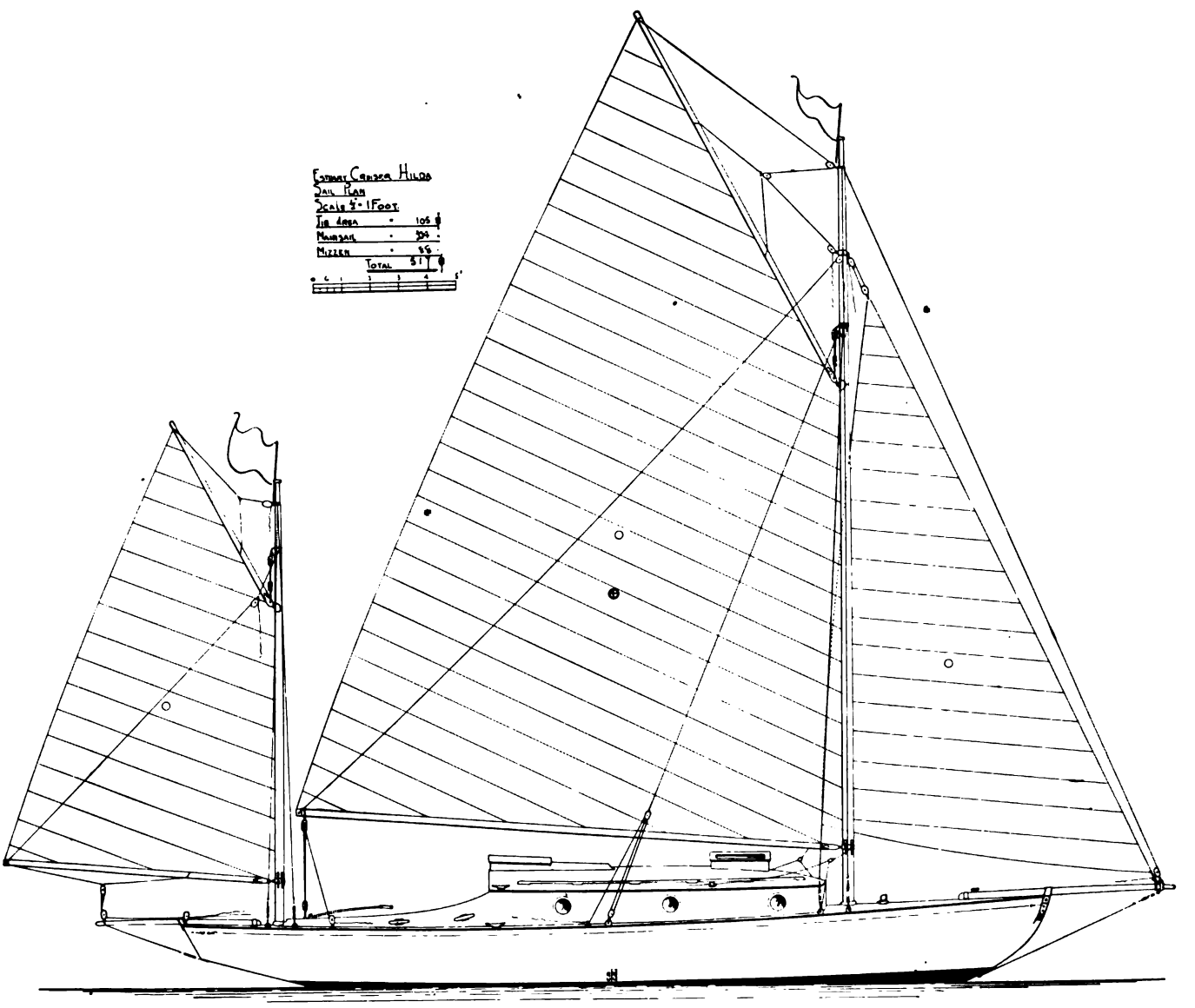


Lines of Forty-Five-Foot Freight Boat



Sail Plan of Thirty-Foot Yawl Described on Opposite Page

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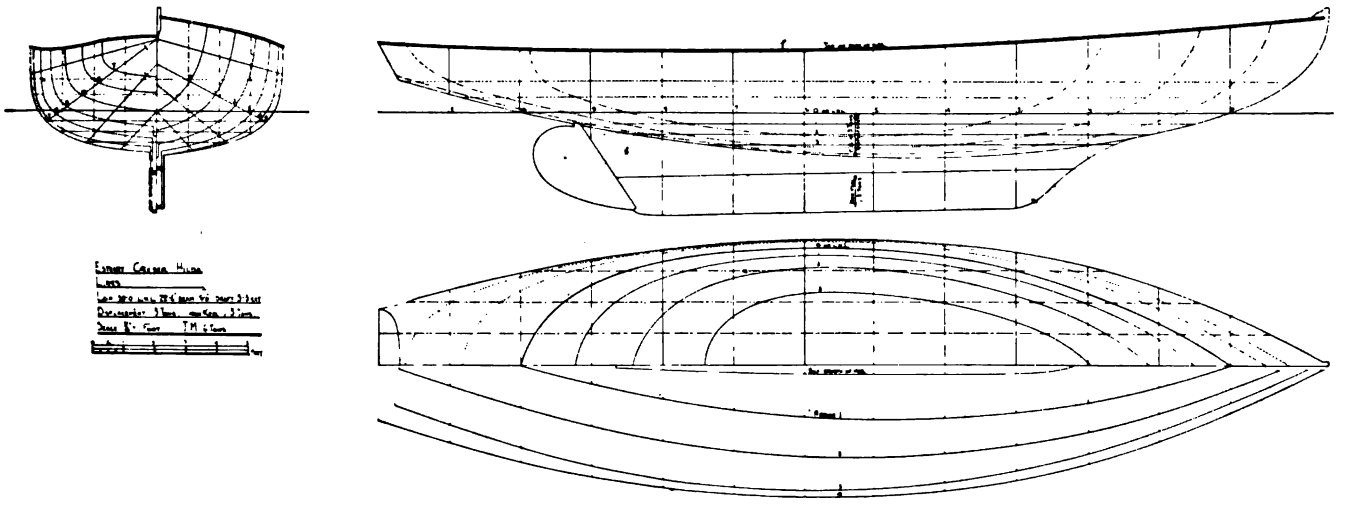
THIRTY-FOOT YAWL

THE 30-foot yawl shown in the accompanying plans was designed by Chas. G. McGregor, of Glasgow, Scotland, and is described by him as an "estuary cruiser." The scantlings and building particulars of the little boat are fully set forth in the scantling table, carefully printed by the designer, shown below.

The craft is a sensible little cruiser and under the Thames measurement works out as a six-tonner.

Length o. a.....	30	feet	0	inches
Length w. l.....	22	"	6	"
Breadth	8	"	0	"
Draught	3	"	3	"
Total sail area.....	517	square feet		

PLANKING ¾" KAURI PINE FREE FROM DEFECTS. SHEERSTRAKE MAHOGANY WITH CAVETA RUN IN IT FOR GOLD LINE.
WOOD KEEL 10"x2½" AMERICAN ROCK ELM TAPERED FORE & AFT BENT AS REQUIRED.
TIMBERS 1⅛"x⅞" AMERICAN ROCK ELM SPACED 6" ¢ TO ¢. TO EXTEND FROM GUNWALE TO GUNWALE IN ONE PIECE EXCEPT FORWARD WHERE THERE IS EXCESSIVE V SECTION.
SHELF 3½"x1¼" PITCH PINE TAPERED FORE & AFT.
CARLINES 2½"x1½" PITCH PINE.
DECK & COACHROOF ⅝" T&G WHITE PINE LINING COVERED WITH PAINTED CANVAS.
BEAMS 2"x1½" LARCH MAST & COCKPIT BEAMS 2½"x1¾". SHORT BEAMS 1¾"x1½" ALL DOVETAILED INTO STRINGER & CARLINES.
ON HOUSE 1⅛"x⅞" AMERICAN ROCK ELM BENT TO SHAPE.
DEADWOOD LARCH 6" THICK, TAPERING AT ENDS AS REQUIRED.
BILGE STRINGERS 3½"x1¼" PITCH PINE TAPERING FORWARD & AFT.
RAIL 1¼"x1" MAHOGANY WITH ORNAMENTED WATERWAYS WORKED THROUGH IT EVERY 3'-0" OR 3'-6".
FLOORS GROWN OAK CROOKS SPACED AS SHEWN ON ARRANGEMENT PLAN SIDED 2½" x 3½" DEEP AT CENTRE EXTENDING UP ON EACH SIDE TO BILGE STRINGERS.
KEEL BOLTS ⅝" GALVANIZED IRON HOVE UP ON TOP OF FLOORS WITH GOOD NUT & STOUT WASHER BELOW.
STEM GOOD OAK CROOK SECURELY SCARFED TO WOOD KEEL BY ⅞" COPPER CLENCHES. TRANSOM BOARD OF AFRICAN MAHOGANY.
RUDDER POST OF OAK 1½" THICK AT BACK & TAPERED IN SAME RUN AS DEADWOOD.
RUDDER STOCK OF GALVANIZED IRON 1¼" DIA BOLTED TO RUDDER BLADE BY ⅞" BOLTS. GUDGEONS GALVANISED WROUGHT IRON SECURED TO RUDDER POST AS SHEWN.
RUDDER OF OAK 1½" AT FORE EDGE TO ¾" AT AFTER EDGE.
TILLER OF GALVANISED IRON, EYE SQUARE AT RUDDER HEAD TO PREVENT TURNING, SECURED BY STRONG NUT. FORE END TO BE COACH WHIPPED.
BREAST HOOKS, LOGGING KNEES & PARTNERS, OF ENGLISH OAK 1½" THICK.
COAMING OF AFRICAN MAHOGANY ¾" THICK CARRIED AFT & CHECKED OVER DECK, WHERE IT LEAVES THE COCKPIT.
BULKHEADS OF ORNAMENTED T&G CEDAR LINING ⅝" THICK
CABIN & COCKPIT FLOORING ¾" WHITE PINE.
TIE RODS (4 EACH SIDE) OF ¼" GALVANISED IRON ROD THROUGH SHEERSTRAKE & COAMING CLENCHED.
PLANK FASTENINGS OF COPPER BENT OVER FRAMES. BUT FASTENINGS THROUGH ANY BUTTS TO BE CLENCHED ON COPPER ROOVES.
ALL IRON WORK TO BE GALVANIZED.
SPARS & RIGGING OF GOOD QUALITY FOR THE EFFICIENT WORKING OF THE YACHT. WOOD BLOCKS WITH METAL SHEAVES.
THE CABIN MAY BE EITHER ENAMELLED OR VARNISHED AS MAY BE APPROVED. BELOW FLOORING OF COCKPIT & CABIN TO HAVE 3 COATS BEST BLACK VARNISH, THE REMAINDER OF THE HULL INSIDE 3 COATS BEST COPAL VARNISH. DECK CANVAS PAINTED NAPLES YELLOW & TOP OF ROOF WHITE LEAD PAINT. SPARS 3 COATS COPAL VARNISH AS ALSO BLOCKS. HULL OUTSIDE WHITE TOPSIDES WITH GREEN OR PINK-SALMON BELOW AS MAY BE APPROVED.
ONE 40lb. GALVANISED IRON ANCHOR LONG SHANK FISHERMAN PATTERN & 20 FATHOMS ¼" GALVANISED CHAIN.
PUMP OF GOOD SECTION FITTED ON STARBOARD SIDE FORWARD BULKHEAD TO DRAW FROM LOWEST PART OF BILGES.
THE WHOLE TO BE A GOOD TRADES-MAN-LIKE JOB THROUGHOUT. PLAIN BUT TASTEFULLY FINISHED.



Lines of Thirty-Foot Cruiser Designed by Charles G. McGregor, of Glasgow, Scotland

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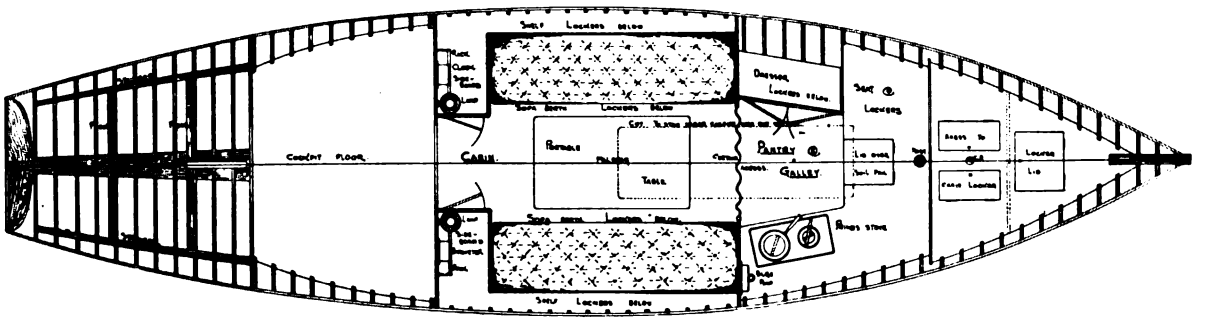
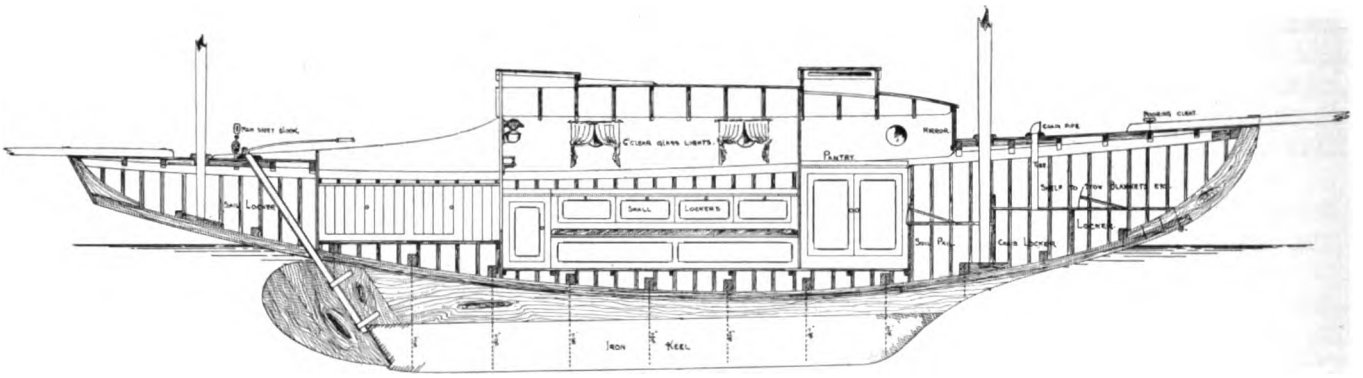
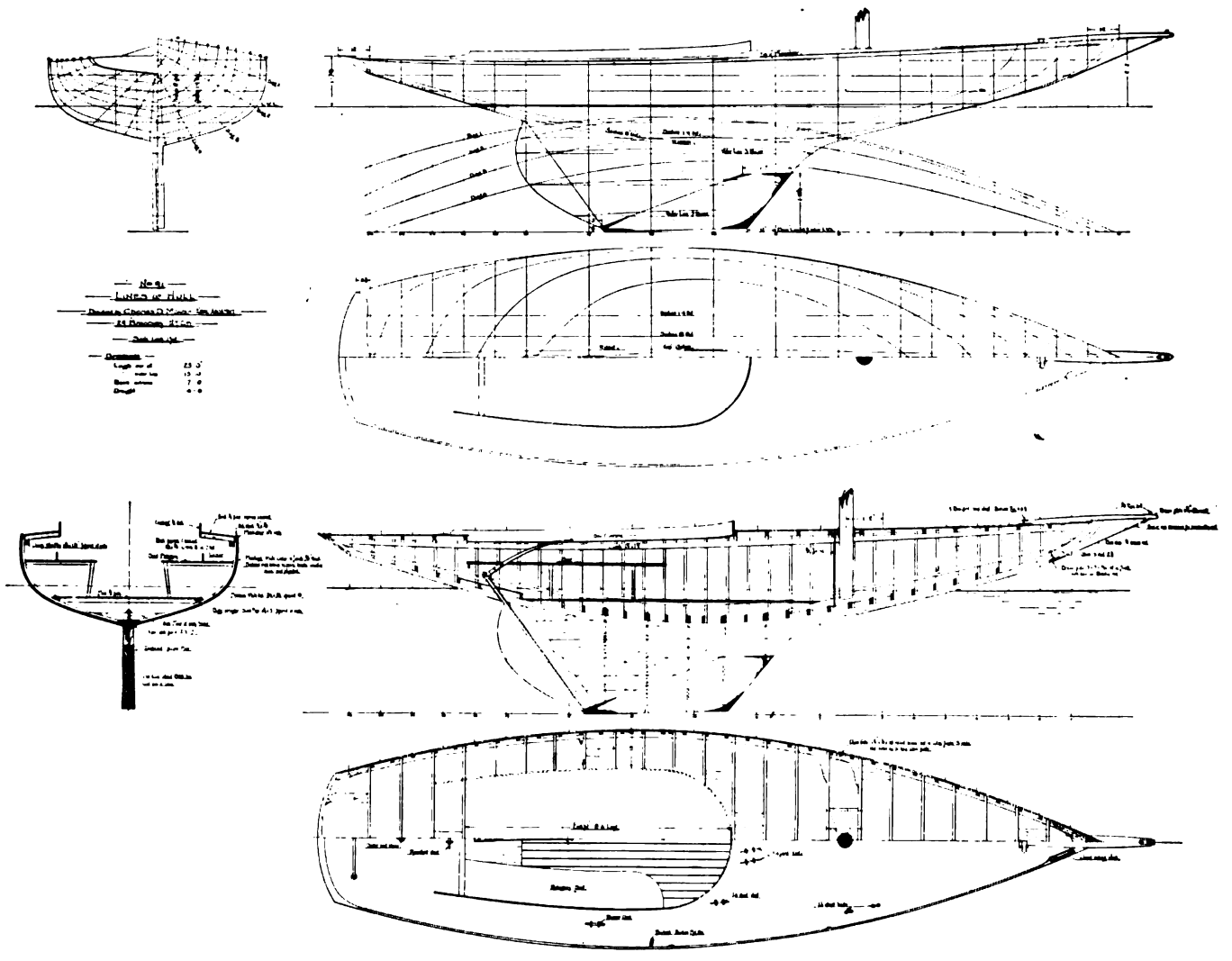




Accommodation Plan of Thirty-Foot Sloop Described on Prévious Page



Lines and Construction Plans of Mobile

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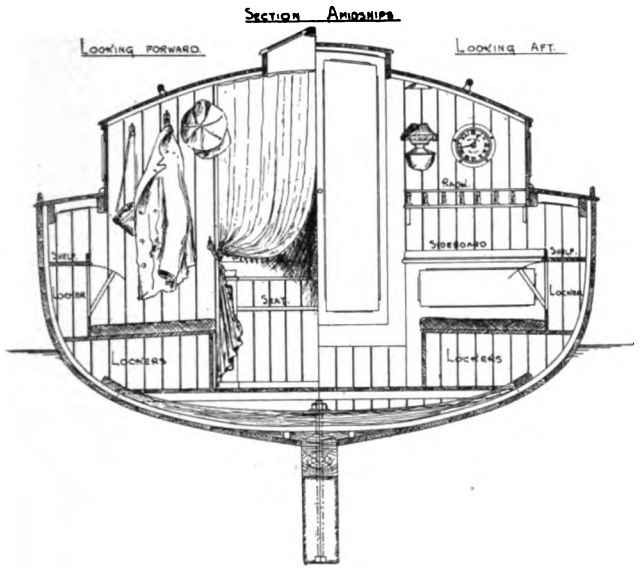


MOBILE

THE sloop shown in the accompanying plans was designed by Charles D. Mower for Reginald T. Outerbridge, of St. Georges, Bermuda, the intention being to produce an easily handled boat, capable of good speed and sufficiently seaworthy to be used all the year round in the waters of Bermuda.

Mr. Outerbridge built the boat himself and the craft has given excellent satisfaction. The sails, blocks, rigging, etc., being of the best American manufacture and the materials which went into the hull for the most part being home products.

The general dimensions are:

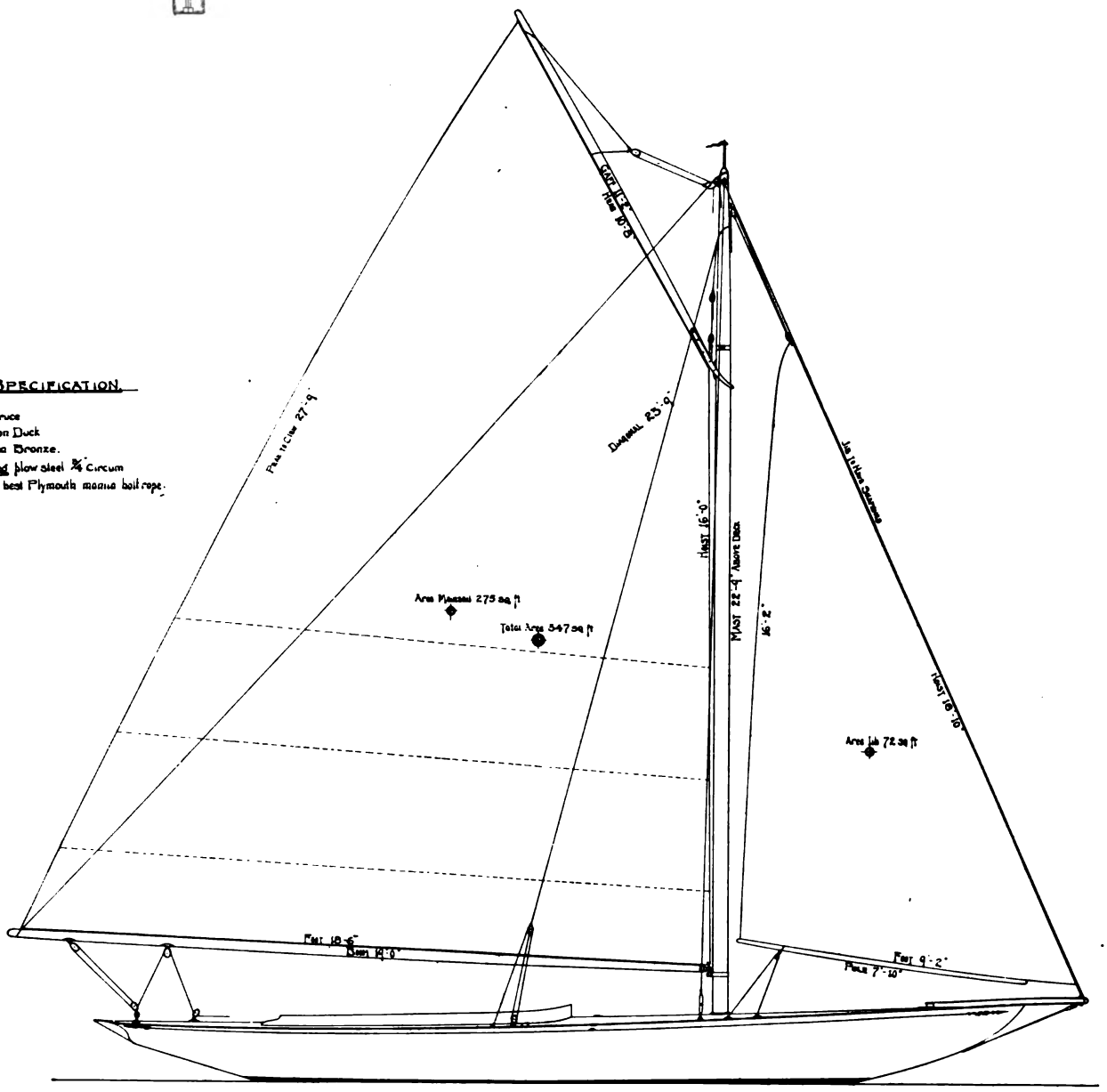
Length o. a.....	25	feet 0 inches
Length w. l.....	15	" 10 "
Breadth, extreme.....	7	" 0 "
Draught	4	" 0 "

Area

Mainsail	275	square feet
Jib	72	" "

RIGGING SPECIFICATION.

Spars Solid Spruce
Sails 6 oz Cotton Duck
Blocks Merriman Bronze.
Standing Rigging plow steel ⅝ Circum
Running rigging best Plymouth manila bolt rope.



Mobile, 25 Feet O. A. Designed by C. D. Mower, New York City, for Reginald T. Outerbridge, St. Georges, Bermuda

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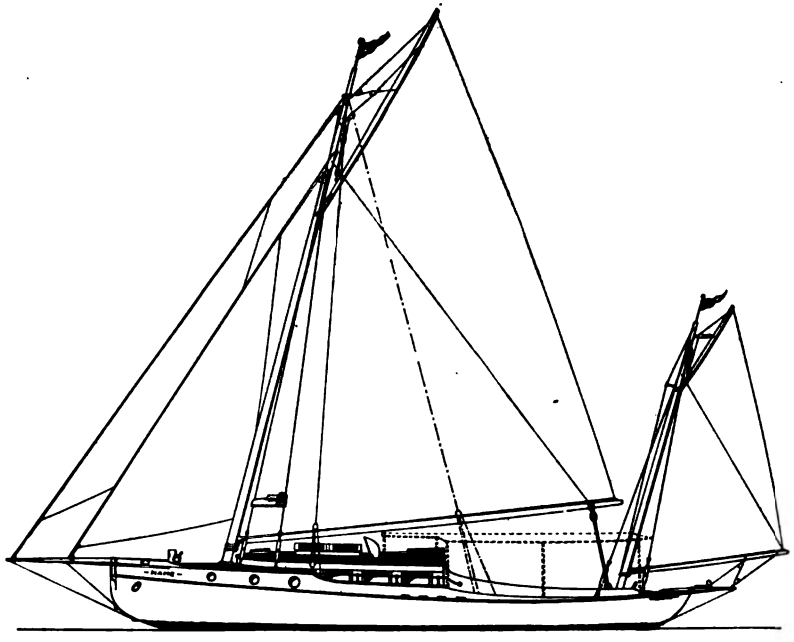
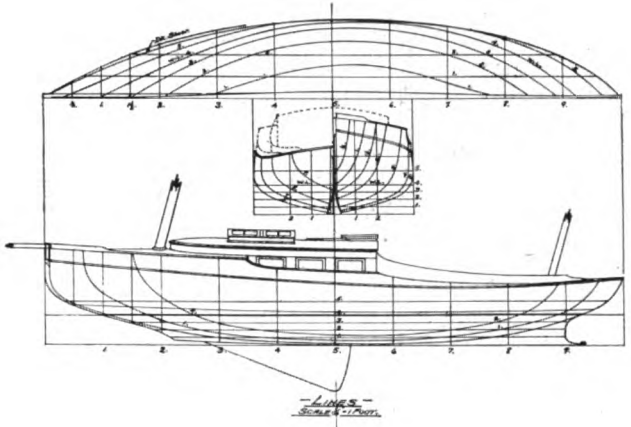
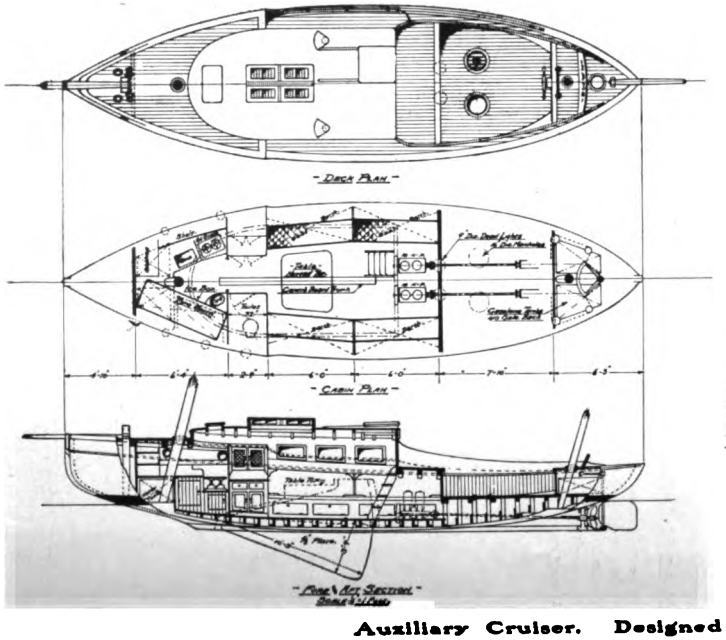


- Outboard Profile -



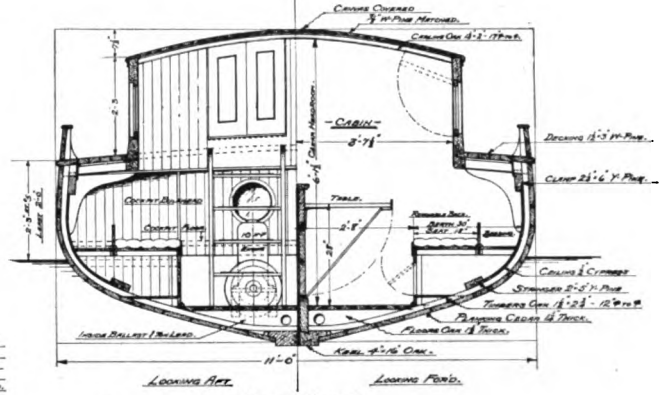
- Lines -
Scale 1/2" = 1 Foot.



- Deck Plan -

- Cabin Plan -

- Inboard Profile & Sections -
Scale 1/2" = 1 Foot



- Midship Section -
Scale 1" = 1 Ft.

"Rudder"
Auxiliary Cruiser

Particulars

Length Over All	40'-0"
" W.L.	33'-4"
Breadth O.A.	11'-0"
Draft	5'-0"
Inside Ballast (Pig Lead)	2000 Lb.
Twin Screw	2-10 H.P. Engines
Displacement	About 8 Tons

Auxiliary Cruiser. Designed by W. S. Macdonald, New York City

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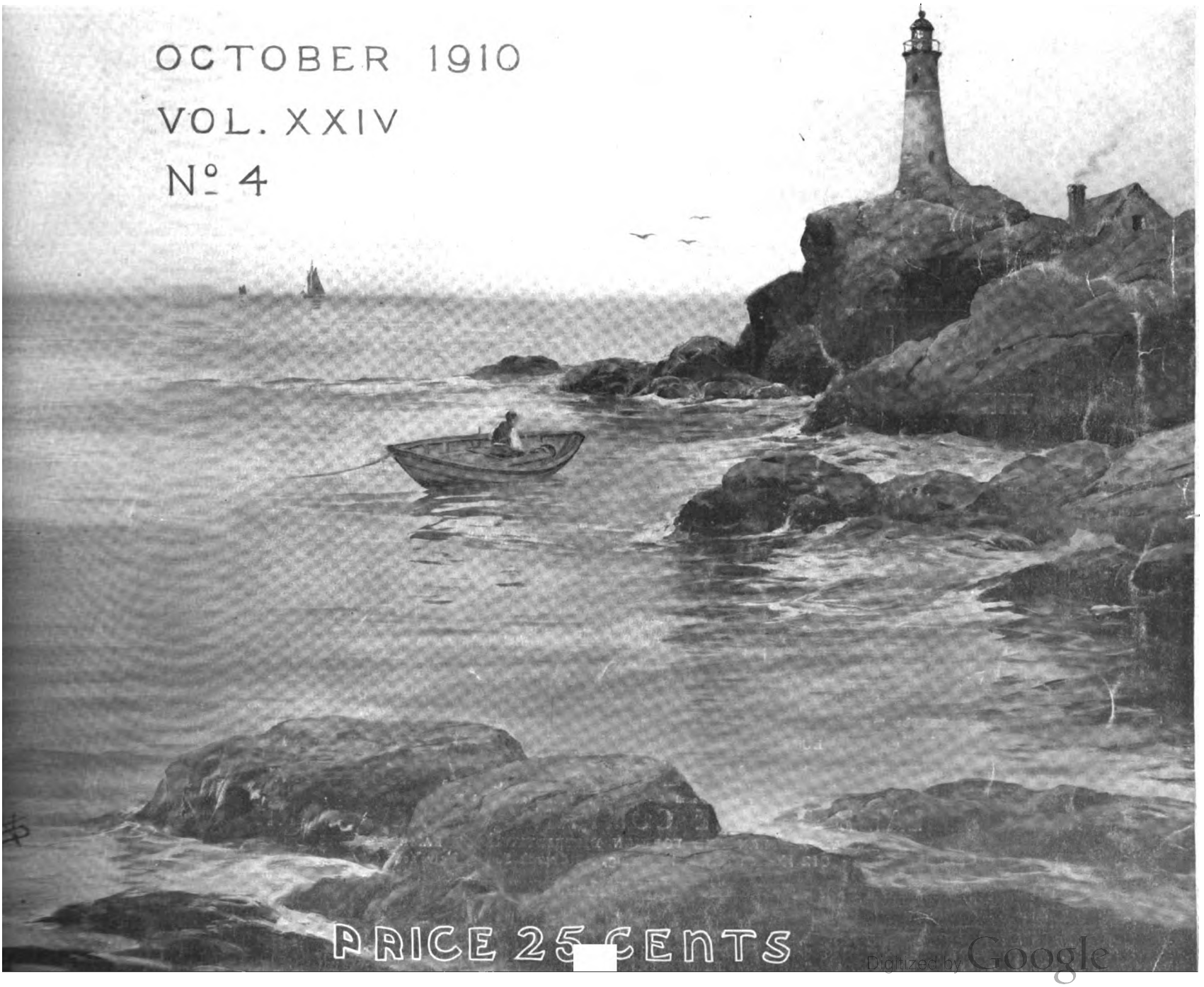

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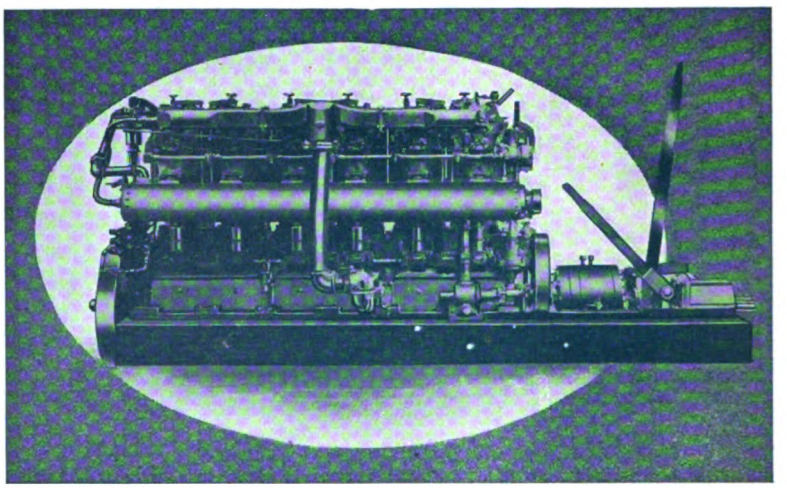

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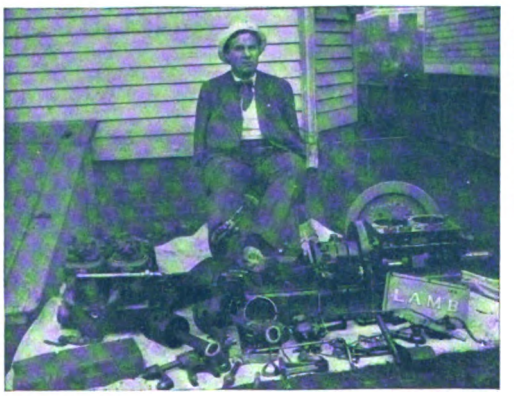

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Edited by THOMAS FLEMING DAY

Vol. XXIV OCTOBER, 1910 No. 4

THE SECOND INTERBAY CATBOAT MATCH

Winfield M. Thompson

IN the second Interbay catboat match one fact stood out like the tip of Pico on a clear morning, sharp and clean-cut. It was that in the Cape cat America has one type of boat that no amount of scientific tinkering can spoil, and a quarter-century of shrewd Cape Cod experience has served only slightly to improve. The winning Massachusetts team was composed of one boat 23 years old and another—which proved to be the champion—not 23 weeks old. Yet the difference between them was so slight as to afford keen and exciting sport and to give the races nine-tenths of their snap. The champion of '23 years ago, Iris (ex-Muscilage) was always near enough to the new Dolly III to make her fight hard for her honors, and handsome though the performance of the new boat was at all times, there was a chance of the 23-year-older getting away with the prize pennant; a chance which a breakdown in one race and a fluke in another served nearly as much to diminish as the actual sailing of the new boat.

The winning team represented a contrast of the best in catboat design and construction of a quarter-century ago and of to-day. Individually as well as in team work, they overpowered their rivals from Narragansett and Barnegat bays, taking away ten out of twelve cups, besides the Day Trophy and the championship pennant. This was more than good enough for their respective owners, but it was better in the broader significance of the victory for the sport. The two boats represented conservatism in catboat building, the holding to a pure, original American type, the like of which, as Skipper Day of THE RUDDER said at the dinner in Bristol which closed the week's racing, you will find nowhere else in the world. The racing association they represented makes its declaration of faith a set of rules that bar all attempts at long overhangs, reversed curves, jibs and other heresies that have led astray catboat converts in other waters. The representatives of this association showed that if not tampered with, the genuine Cape Cod boat will provide just as much wholesome sport as the fanciest product of science that rule-making savants can produce. They showed further that genuine skill in tuning up—boat-sense, I might call it—brings wonderful results in a type that men not versed in catboat sailing are ever ready to cry down. The catboat looks to be the simplest of yachts to handle. Children even are advised to begin the acquirement of the art of sailing in a catboat. Men who sail raters and knockabouts and raceabouts and whatnotabouts say, "Oh, yes, catboats; hum—very interesting, but not yachts." It would have opened the eyes of a few of them if they could have seen the catboats as they were sailed in these races. It would have shown them, first, that it takes a good man to handle a catboat in a strong breeze, but that when the right man is in charge the catboat will carry sail and keep going with the most expensive yacht in the fleet.

Beyond this, the match—I am saying this at the risk of forfeiting the good opinion of a designer I have long esteemed—showed the man of science to poor advantage beside the mere boat-builders who had made the production of this type a life-study. Possibly the champion of science in designing may say: "Pooh! Who would want to design a Cape Cod catboat, anyway? Where's the science in a catboat? It's no trick to whittle out a model, build to it, and monkey with the boat until she balances right. Any designer could do it, if he cared to take the time." Possibly. But any de-

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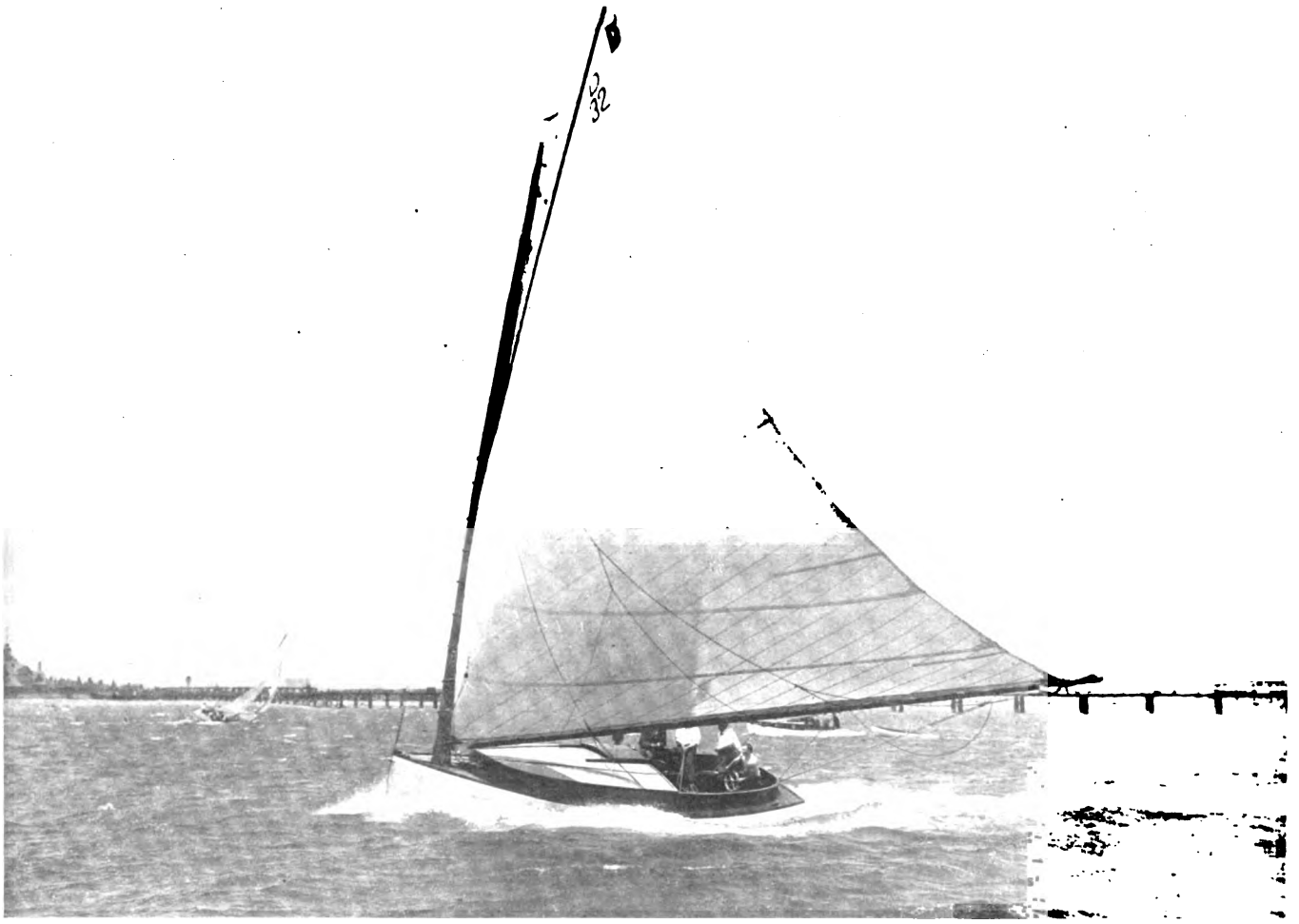
signer doesn't take the time, and science has not offset the rule-of-thumb knowledge of the men who have perfected this native type of boat. Herreshoff, Cary Smith, Gardner, Gielow and others less famous have turned out, at different times, a catboat design or two. None of us can recall offhand any of their boats of this type that were startling successes, their weakness lying, in nearly every instance, in features that either were not a part of the Cape cat design, or were some exaggeration of it.

These verities form no manner of basis for reflection on the ability of the designers named. Neither do they reflect on the skill of Charles D. Mower, who designed Virginia especially for the Interbay match, which boat, charioting the fortunes of Barnegat Bay, competed with four boats from down East, and finished at the foot of the list. All four of the better boats were built on models tested by years of experience. Three of the four were frankly rule-of-thumb boats. The other, Dolly III, winner of the series, was built on the approved Osterville model, which was developed long before young Ralph Crosby introduced drafting as an accessory to the Osterville shops. Thus, while this boat represented a touch more of science, perhaps, than the other Eastern boats, she was the product of hard-earned Cape Cod knowledge, and not of the drafting board.

This comparison of the character of the contestants in the Interbay match is not drawn here for the purpose of disparaging scientific designing, any more than it is the work of Mr. Mower. It is made, rather, to illustrate, in a manner that seems pat, the mistaken idea that prevails as to the amount of care needed in the production of a successful catboat. The Barnegat Bay entry in the match, Virginia, transgressed nearly every traditional rule of Cape Cod for the making of a successful catboat. She had no sheer worth mentioning. That her underbody was wrong was indicated by the way she cocked up her quarter when going to windward. She thumped and splashed in a seaway, and leaked in the bargain. She had a hollow mast, and shrouds to hold it up, things in themselves that would cause a Cape Cod catboat skipper to laugh himself into a fit. A stiff mast, stayed hard and fast, is contrary to the theory of the down-east builders as to what makes a Cape cat go to windward. They believe the mast should have play at the top, and do not encourage struts or shrouds. A good stick, which will bend more or less, is believed to lift a boat into the wind. The value of one of this sort was well illustrated in the first race,



Dolly III at Home

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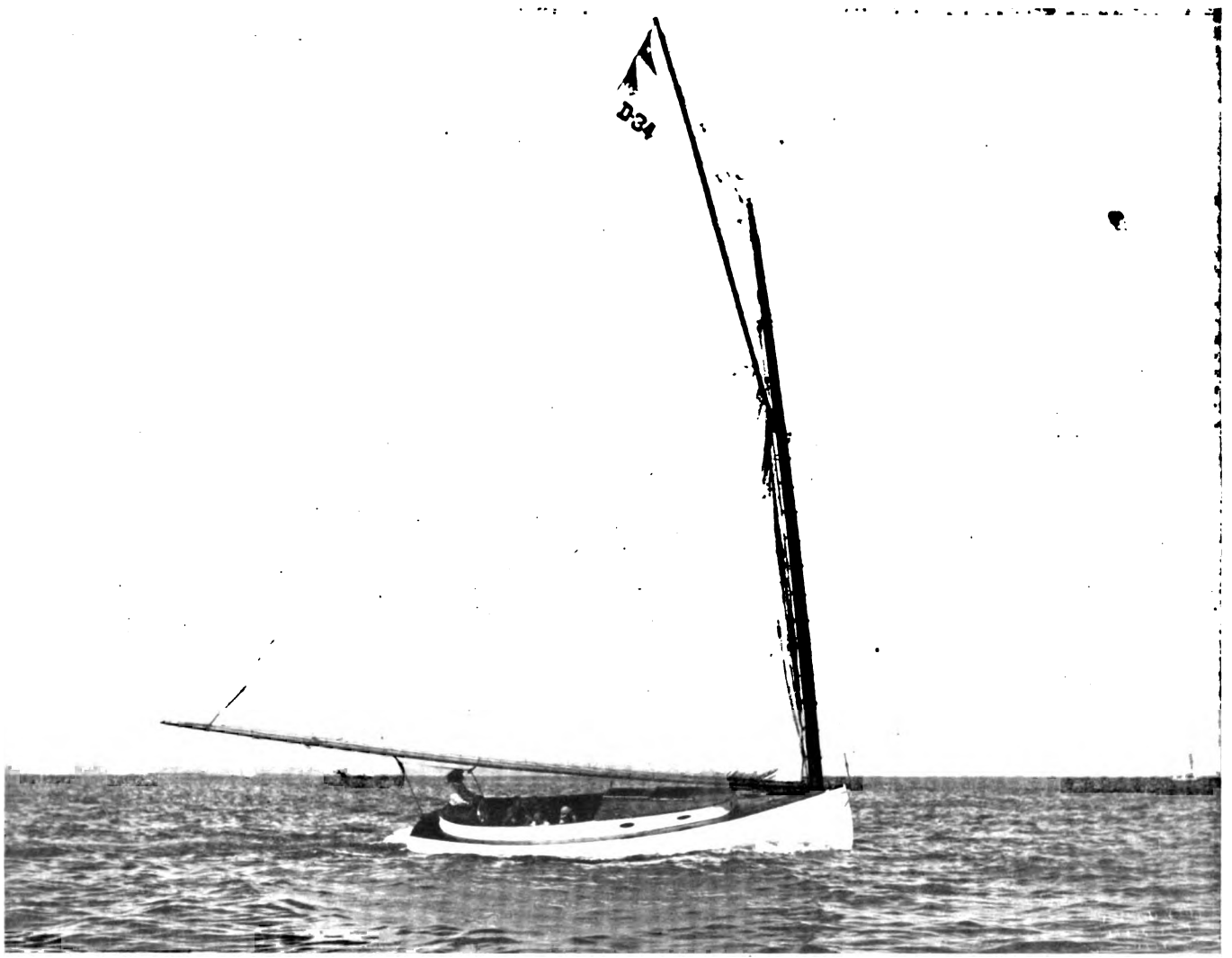

Iris

when Iris carried away her forestay, and kept on, in a hard breeze, going to windward as if nothing had happened. The masthead bent, but her speed did not fall off, except when a man went forward to put a whip on the broken stay, and she won. The action of the mast and the boat under this situation was in exact accord with the belief of her designer and builder, C. C. Hanley, who told me only last Winter, "You really don't need a forestay on a catboat's mast. They're only convenient to hang on by when you go forward. Don't put on a strut anyway. They put your mast in danger." I had thought this a pretty strong view, until the accident to Iris. Then I saw it was the stick itself that took the strain.

But to continue with Virginia (Mr. Mower will forgive me in time, I know, since it is all in the interest of the sport). The cut of her mainsail was good for a sloop, but unsuited to a catboat, there being relatively too much hoist, not enough peak, not enough boom, and not enough draft along the luff, where the draft must all be in a catboat sail, if it is to do effective work.

These may be little things, but any one of them was sufficient to damn the boat in the critical eye of the everyday catboat sailor. The sheer, to be sure, might have no effect on speed; yet in a cat a sheer like a billiard table presupposes faulty lines elsewhere, and is a pretty safe guide to a tubby boat. Hasty construction, though sometimes a matter of necessity, in a catboat is a dead loss of money, for with her mast in "the eyes of her," a cat must be soundly built to stand the strain; while a leaky boat, as most of us know, is an abomination, even though she leak only when driven.

But these contrasts between the Barnegat boat and the down-easters was not without valuable compensation. The boys from the Island Heights Y. C. knew from their arrival at Providence, where the match began, that they were outclassed, and that their boat did not come up, in build, design and nicety of rig, to the standard established by the others in the match. This, however, did not deter them from going through the match with vigorous spirit, and a determination to learn all they could from its lessons. Their friends had no reason to apologize for their handling of the boat, for she was handsomely sailed by Leslie F. Mulford, of Camden, N. J. His sporting spirit was worthy of better reward next time. The same could be said of her entire crew, and of John McIntire of their club, and other members who had worked hard, and dug deep for coin with which to put forward their venture. I regret that owing to an accident to my camera I was unable to obtain a group picture of the boat's crew.

The Narragansett Bay men supported their hard luck

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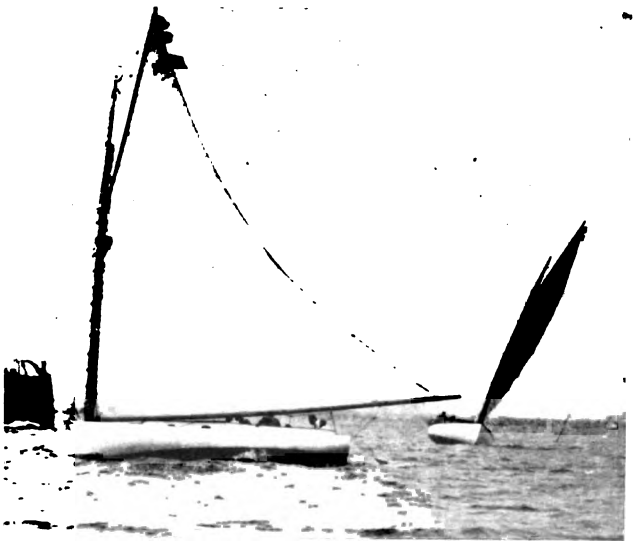

Iris Turning Weather Mark, First Race

quite as cheerfully as the boys from Barnegat. Their boats, Ina and Bother, had brought the cup from Barnegat the year before, and they had reason to suppose there was a fair chance of their retaining it—until the Massachusetts Bay contestants appeared. Then they saw that their chances in a blow would be slim, for the Massachusetts boats were bigger than theirs, more powerful, and carried more sail per foot of length. It fell out that four of the five races in the match were sailed in hard winds, in which the two boats from North of the Cape simply overpowered the others, notwithstanding that their sail-spreads were so much larger. In the case of Dolly III power was obtained from a high-sided, "husky," able model of 11 feet breadth and a very buoyant form, which took the sea as handsomely as a duck. In the case of Iris there was some six inches less freeboard all around, but great breadth, a strong 12 feet, while she carried no less than 4,200 pounds of ballast, which was about a half ton more than Dolly, and had a crew aggregating over 1,300 pounds in weight. Her helmsman weighed 210, her mainsheet man 240, one other member of the crew 205, and the others not less than 160 each. She also raced with all her cruising dunnage aboard, not less than 400 pounds in the aggregate; all this being in accord with her owner's belief that plenty of weight doesn't hurt a catboat, that "skinning out" a boat for a race is folly, and that most catboats have not half enough ballast to bring out their best gait. Strong winds strengthened this theory, though it was to be noticed that on the only light day of the match, the last, all the other boats "ghosted" faster than Iris. "That's all right," said Skipper Crane. "Let 'em go. I'm glad to see Bother win. She deserves it. But I'll tell you, my son, races aren't sailed in calms every day, and I'll hang to my ballast."

The sail-carrying ability of Dolly and Iris was an element of surprise to the other contestants. The comment I heard most frequently at the Edgewood Y. C. house before the start of the first race in the match was that the visitors from Boston would "have a job carrying those sails in Narragansett Bay." Some skeptics seemed half to expect them to turn turtle, or lose their masts, and were much surprised when the two walked off to windward under whole sail in a strong breeze, leaving the other three boats in the team trailing.

In a match in which over-all length is the basis of measurement, the importance of sail-carrying is paramount. Yet the sail must be carried with perfect balance, or its power is of little value. Both the Boston boats were perfectly balanced. No matter how hard they were driven, they steered steadily and kept going. On every point of sailing they disproved the venerable libel that a catboat steers like a wild horse when driven hard. They showed that in all kinds of going they were thoroughly dependable. There was no running away, no broaching to in hard puffs, no grinding on the helm when going free. The secret of this was their perfect balance, the proper relation of sail to hull, which is obtainable in a catboat only by years of experience, and by some men is never attained at all. In this one point all the other points of the catboat's design and rig center. Her lines may be of the best—if her centerboard is in the wrong place she will not sail properly. If she is not ballasted to a nicety, all hope of winning is lost. If her stern is not the right shape, she will be thrown off her balance when taking a stiff angle of heel. Thus on, showing that there are more things in catboat philosophy than most scientific designers care to acknowledge. These same things may be present in some degree in all types of boats, but with sloops added headsail, or some such device, may be employed to cover the defect. No such factitious aid is at hand for the catboat man. He must work with his single sail, and strive to strike the nice point of balance that is the only means of obtaining results.

* * *

But before going more deeply into the business of catboat, I will give the result of the match, which began Monday, August 15, 1910. Five races were sailed, on the percentage system of the Narragansett Bay Y. R. A., by which each win scored 100, second 80, third 60, fourth 40, and fifth 20. Under this scoring system Dolly III, of the Quincy Y. C., with two firsts and three seconds, scored 440 points, or an average of 88%; Iris, Quincy Y. C., with two firsts, a second and two fifths, 320 points, or 64%. Their team standing was 76%. Ina, Edgewood Y. C., scored 280 points, or 56%, and Bother, Edgewood Y. C., 260 points, or 52%. Their team stand-

Bother

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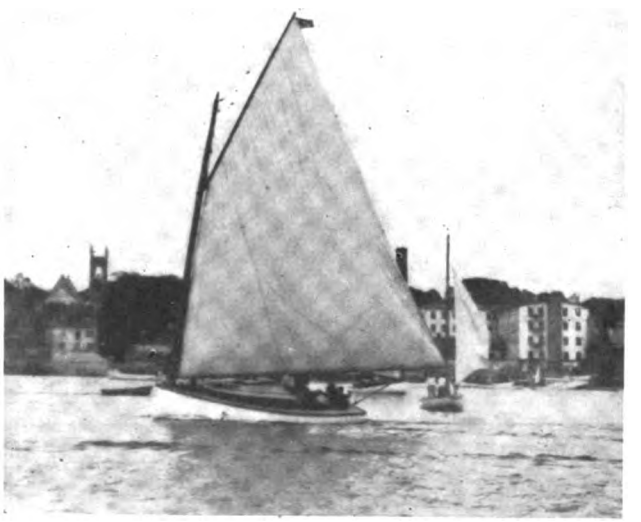
Ina at Bristol

ing was 54%. Virginia, Island Heights Y. C., scored 200, or 40%, the score for Barnegat Bay of course being the same. In the first day's race Iris took a handsome silver vase put up by the Edgewood Y. C., while Dolly took second prize. In the second race Dolly took the Rhode Island Y. C. Cup, and Iris second prize. On the third day, an invitation race for the visitors, Iris won the Rear-Commodore Markham Cup of the Edgewood Y. C., and Dolly took second prize. On the fourth day—the third race of the Interbay match—Iris took the Fall River Y. C. Cup, and Dolly second prize. On the fifth day, at Jamestown, Dolly took the Conanicut Y. C. Trophy, and Ina captured second prize, Iris having broken down. On the sixth day, at Bristol, Bother took the first cup, and Dolly the second prize.

The winning of the Day trophy by the Massachusetts Bay team meant that the races for it in 1911 would be sailed over courses in the home waters of the Massachusetts Bay Cape Catboat Association, beginning in Quincy Bay, as both boats of the winning team hail from the Quincy Y. C., and that club's station is practically the headquarters of the association. This association rates its boats on a mean-length rule, L being water-line plus one-third the overhangs. This rule was adopted in deference to owners having boats with overhangs. It is probable that as a result of the winning of the Day trophy, the association next season will sail under the over-all length rule of the Interbay Cabin Catboat Association. This would come down hard on only one or two boats in the home class. It would oblige Dolly to give time to Iris, whereas she now at home receives it; but since Dolly has proven fast enough to take care of Iris on over-all length, it is not probable that her owner would object to the change of rule.

While the allowance of seven seconds a foot a mile is good for boats of approximately equal sail area, in the Interbay match the difference in length of the contestants did not give the smaller boats enough allowance to help them materially in a blow, owing to the larger amount of sail per foot of length carried by their larger competitors. The tape showed Dolly's length as 26.69, Iris 26.50, Virginia 26, Ina 25.50 and Bother 22 feet. Dolly III and Iris each carried about 900 square feet in her mainsail. Dolly's boom was 36 feet, gaff 25, hoist 20. Virginia had 765 square feet, Ina 750 and Bother 700. Bother carried all solid spars, being the only boat in the match to adhere in this respect to traditional catboat custom. Ina had a hollow gaff, and so had Iris, while Dolly III, like Virginia, had hollow boom and gaff. Virginia's mast was hollow as well. Dolly III was built in the shop of Daniel Crosby & Son at Osterville, in the Spring of 1910, to the restrictions of the Cape Catboat Association of Massachusetts Bay. (The rules of this Association were used as the basis of the Interbay rules framed last Winter at Providence, under which this match took place.) Her owner, W. W. Arnold, a shoe manufacturer of North Abington, Mass., had formerly owned a smaller cat, Dolly II, built on the same moulds as Twister (described in THE RUDDER for April and May, 1906). He wanted something to beat the class in Boston harbor, and got the best boat the builders could turn out. The spirit of the restrictions was observed in her in every way, and their letter was exceeded in several particulars.

While a practical catboat sailor, Mr. Arnold could not be on the boat for every race, and for the first two she was sailed by J. W. Coombs, one of the best helmsmen in Massachusetts Bay, owner of a little Shiverick cat called Busy Bee, which had taken a championship of her class there. Mr. Coombs had never handled Dolly before, and was unable to remain for more than two races. The helm was then taken by Frank W. Brown, of Quincy, who was also new to the boat. Mr. Arnold was in the crew the latter part of the week. Daniel Crosby, who built Dolly III, and Ralph Crosby, his son, put in the entire week on the boat. The elder Crosby had hoped to sail her, but as he was not a member of a club in the association she represented, the rules prevented him from taking her wheel. His handling of the boat would have added great zest to the match, as he is rated as "a regular he-one" among the native catboat sailors of Cape Cod, and has a great reputation for taking a boat out to windward when it blows. Dolly was well handled, however, in every race, as she had need



Virginia

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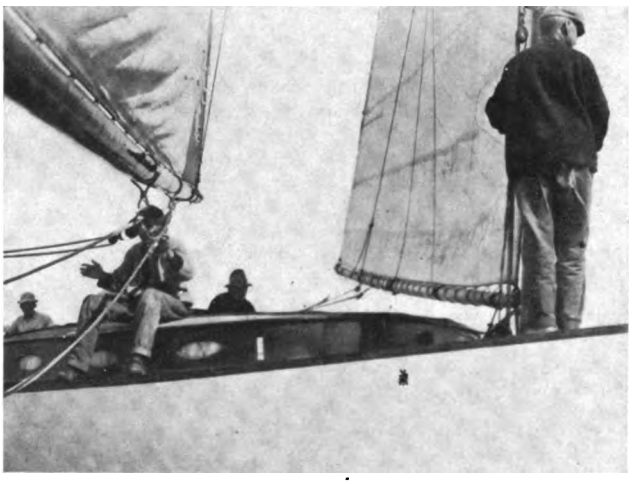
Virginia at Bristol

to be, in competition with Iris with Frank Crane at the wheel. Crane has been in the game many a year. He sails his boat with absolute serenity, no matter how hard it blows. The only time I ever saw him get fidgety was in a calm, when he lost steerageway. He knows exactly the resistance of Iris to the wind, and will keep her on edge for half an hour at a stretch with the water hissing along the edge of the washboard, and never a cupful coming into the cockpit. Skipper Crane grieved the lads in Narragansett Bay by carrying his crew in the cockpit, while all the others laid out to windward. "Get your weight as low as you can," is his theory. "What's the use of putting your men up in the air, to catch the wind? Let your ballast keep your boat on her feet, and you keep your men inboard, and as low as they can get." On this theory he had taken her through many a rousing race, winning with her the championship of Massachusetts Bay the year she was 21 years old, and repeating the performance when she was twenty-two.

There were men around Narragansett Bay who remembered Iris in her heyday, when C. C. Hanley, the genius of Monument beach, who had built her as the apple of his eye, took her down to Newport for a dark horse, and E. D. Morgan, of New York, offered him a fancy price for her if she should clean out the crowd in a Fourth of July race. Hanley sailed her, and made



Close Quarters. Iris' Boom Over Dolly III

the others "look like a dock," as they say on the inland seas. Mr. Morgan paid the price, had half her cabin house cut off forthwith, and started the boat on a racing career that for duration and victories has probably never been equaled among American small yachts.

So many words on the winning team must not lead me to neglect the losers. The Narragansett Bay team were excellent boats, and would be counted fast with the winning team out of the way. Ina is a handsome Osterville model, built about eight years ago in the shop of Wilton Crosby. As an existing boat when the rules came into force, like Iris she did not need to meet the same requirements as Dolly III or Virginia as to freeboard, height of cabinhouse and floor and other details. Having a short overhang forward, she looked to me a very sweet model, as she lay at the Edgewood Y. C. float on the opening day of the match. She was sailed by W. J. Rooks, a catboat helmsman of more than local reputation.

Bother, modeled by W. E. Simmons, of Providence, and built by Brown at Taunton, appeared to be a smaller edition of Ina. A noticeable feature of her cabin was

Crew of Dolly III

that it had no slide. This, with its low headroom, would bar her as a comfortable cruiser. Bother was skilfully sailed by one of her owners, J. Harris Foster.

All these boats had the conventional plumb stern, the best by long odds for a boat rated on over-all length, and to my mind the best under any measurement for producing speedy lines in a cat. Virginia's stern varied from the others by being cut up on the counters, and having a slight rake as well, while it was the narrowest of the five, in proportion to the boat's breadth. Virginia seemed to be very lightly ballasted, and sat on top of the water.

In the matter of canvas, Iris was better served than any of the others. Her sail had great driving power, and held its shape. Dolly's was altered before the match by shortening the luff rope 18 inches, and had a bag in the luff at the end of the week. Virginia's sat well, but was the wrong shape to give speed. Neither Ina nor Bother could get her sail to sit smoothly along boom and gaff. Everybody remarked on the beauty of the sail on Iris. It came from the loft of a Boston sail-

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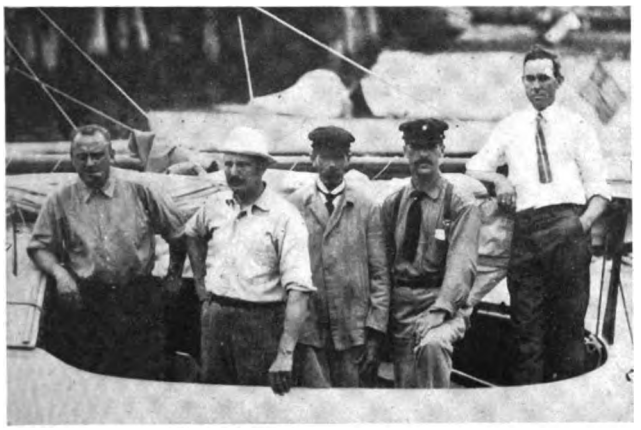

Crew of Bother

maker who specializes in sails for Gloucester and Boston fishermen, and makes a good many sails also for Boston Bay cats.

The crews as they stood before the first race were as follows:

Dolly III—Daniel Crosby, J. W. Coombs, Ralph Crosby, Frank Brown, Charles M. Scudder and H. Seymour.

Iris—Frank F. Crane, Henry S. Crane, Frank Freeman, Ralph G. Crane, T. E. Furnald and Winfield M. Thompson.

Ina—R. I. Fuller, W. J. Rooks, Walter Sidebottom, Ben C. Rooks and Ben C. Rooks, Jr.

Bother—J. Harris Foster, John D. Peck, William E. Simmons, Newton C. Arnold and Richard P. Cole.

Virginia—Leslie F. Mulford, Lewis Tissot, Jr., Harry Edson, John Drumm, William G. Gaston, Jr., and John Norris, Jr.

Each contestant was allowed a pilot, or in place of a pilot an extra man, in addition to the usual crew of one man for each four feet of length.

The match being sailed in conjunction with the Narragansett Bay Yacht Racing Association's midsummer week, President T. R. Goodwin of the association had his managerial hands full. He was aided by the officials of the respective clubs on whose courses the races were given. The Edgewood Y. C. officers were keenly alive to the importance of their part in the match, and were cordial in their greetings to the dozen or so yachtsmen

Crew of Iris

from the neighborhood of Boston who went down to see the first race. The visitors were taken aboard Unome II, the flagship of Commodore Dutee W. Flint, and Rear-Commodore C. F. Markham's Alice, and carried around the course. After the race they were bidden to a dinner at the clubhouse. All through the week these two launches followed the racers, and lent assistance in towing from port to port whenever practicable. The most cordial good fellowship was found by the visitors wherever they went, and though at times some of the contestants found it hard to overcome a habit of protesting —which seems to have taken a deeper hold than ordinary in Narragansett Bay—good humor prevailed, and the match was run off without a hitch of this or any other sort.

I give the details of the races in the order in which they occurred.

First Race, August 15th

The weather was not promising. Clouds hung low and heavy, and there was a thin spatter of rain just before the start at 1:45. The wind was Southwest, drawing up the Providence River in a soggy wholesail breeze. The course was laid down the river—here a mile

Crew of Ina

wide—to Conimicut Point Light, and thence to a buoy off the north end of Prudence Island, and return, 13½ nautical miles. The course to the light called for long and short hitches. Thence it was a dead beat three miles to the turn, and a run back, with a broad reach home.

The breeze was freshening at the start. The boats did very little maneuvering, as they did not arrive at the vicinity of the line until five minutes before the gun. All held to the western or weather end of the line to cross on the starboard tack. Bother was over ahead of the gun and was recalled, and Dolly III was best timed, cutting the line with the gun. Iris was a trifle ahead and jibed, crossing at Dolly's weather quarter, five seconds after the gun. At Iris' weather quarter was Ina, a length or two astern. The Barnegat entry was last. The three leaders soon tacked to port. Ina tacked for the west shore and Iris on top of her. Dolly immediately tacked also. It was the merriest kind of work for the next quarter hour, tack and tack, in the keenest fashion. Dolly fought hard for the lead and never sailed better, while Iris held on her quarter like a leach. When after some 20 minutes' sailing they split tacks, and after a

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short hitch crossed, Iris had a clear lead of almost four lengths.

As the boats continued to work down the river it was noted that the two Providence boats took opposite sides of the stream, Ina favoring the western bank and Bother the eastern. Any shift of wind would thus have favored the home team. The three visitors worked down midstream, Iris being in the most westerly berth of the three, with Dolly next.

At Bullocks Point Light, a mark near midstream, the Massachusetts Bay team had a lead of a third of a mile over the nearest boat astern, Virginia. Iris had about 100 yards advantage clear to weather of Dolly. As Iris passed Conimicut Light and started the straight hammer to windward, she still held her advantage as before. This was a critical point in the race, and an unfortunate one for Ina, whose sail came down from the throat by reason of a broken hook. She anchored and rigged a rope pennant, which also gave way. By the time she again got going—this time under two reefs—the other boats were bound home.

Halfway up the wind Iris carried away her forestay at the stem-iron, and was obliged to send a man forward to make repairs by putting on a whip. This let her smart rival, Dolly III, up a little. Iris was kept going, however, and turned the weather buoy 45 seconds ahead of Dolly. This represented, when they had eased sheets for the run, about 100 yards. The other boats were distanced, Virginia being third to turn, 9 minutes 35 seconds behind Iris. Bother was 25 seconds behind Virginia.

Dolly picked up 9 seconds on the run, but on the broad reach she could not quite hold Iris. They made a close race to the finish. When they came over the line their nearest competitor was a mile astern. The summary:

Name and Owner	El.Time	Cor.Time
Iris, F. F. Crane, Massachusetts Bay	2:26:09	2:25:51
Dolly III, W. W. Arnold, Massachusetts Bay . .	2:26:48	2:26:48
Bother, Peck & Foster, Narragansett Bay . . .	2:39:58	2:32:35
Virginia, John Norris, Barnegat Bay	2:35:21	2:34:16
Ina, E. A. Kettlety, Narragansett Bay	3:16:00	3:14:08

Second Race, August 16th

It was not my good fortune to sail in the following race, or those up to the last, and I am obliged to rely for facts concerning them on published accounts, and points from the crews.

The second race was started in a reefing breeze from the North and a little by the East, off the Prudence Island station of the Rhode Island Y. C., at Potters Cove. The line was established by anchoring a flag boat off the wharf. All the boats came to the line under shortened sail. Dolly III had in a single reef, which proved to be exactly a pattern for her. Iris had in a double, and found soon after the start that she did not have enough canvas to hold her speedy team-mate. The course was laid with a windward leg to Ohio ledge buoy, about three miles; a reach to a buoy off Hog Island, outside Bristol Harbor, and after a jibe there a reach home. This was repeated, giving the boats about 16 miles in a 20-knot breeze and a hubbly sea.

The boats were bunched in the start, Dolly III being paired with Ina, and Virginia with Bother.

Dolly III at once drew out ahead. Handsomely taken to windward by Coombs, she was first to turn the weather mark. On the reach Iris shook out, sending a man out on the boom in smart fashion to cast off reef points. This in a high wind and strong sea was a new stunt to some of the other crews.

The increase in canvas on Iris helped her pick up on the leader, but it had come too late to save her from defeat, Dolly finishing 1 minute 25 seconds ahead of her, after a roaring race. The others trailed, Virginia being

At the Edgewood Yacht Club Float

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beaten about 13 minutes and Bother about 15. The times:

Name	El. Time	Cor. Time
Dolly III	2:50:38	2:50:38
Iris	2:52:03	2:51:33
Ina	2:56:32	2:54:17
Virginia	3:03:40	3:02:25
Bother	3:05:40	3:06:32

Special Race, August 17th

Through the liberality of the flag officers of the Edgewood Y. C., two handsome cups had been offered for a special race between the visiting boats. This race did not count for the Day trophy, but it proved the hardest fought of the series. The course was from the same start as the day before, to a black buoy off Popasquash Point, opposite Bristol, and return, twice around, the first leg of each round being to windward. The start was to have been at 1:45, but Virginia asked time to go to Bristol and put a strap on her rudder, which was weak. This was granted. She was back ready to start at three o'clock. Captain Crane of Iris kept a log of the week, and from it I am permitted to describe the race as he saw it:

"The line was laid squarely across the wind, from the float to a white sloop. The power boat Sarah was moored a little to leeward of the float, and 10 seconds before the gun Iris, Dolly and Virginia were doing some lively sparring for place around that boat. There was just room enough between the boat and the float for one catboat, and Iris landed there. Dolly gave the boat a good smart bump in passing. It was a very close start, with Iris berthed a little to windward. As we drew off the land we stood on a long starboard hitch toward Popasquash Point. Near the buoy we took four short hitches, and rounded the turn 30 seconds ahead of Dolly and well ahead of Virginia. Dolly ran us down the wind, as she carried whole sail, and we had in a single reef. She covered us just before we reached the line. There was quite a hubble on, and Dolly luffed sharp around the mark, with only about a dozen feet between the sloop and her starboard quarter. We had a mind to berth Iris between the two, but kept off, just clearing the end of Dolly's main-boom. As we trimmed in on the starboard tack I noticed Dolly's mainsail was not quite full, and she was going slow. Iris was put sharp about, given a rap full under Dolly's stern, and shot well to windward, and before Dolly got her gait Iris had the weather berth, and was off on the same long hitch as before. We learned afterward that Dolly had temporarily lost the end of her main-sheet.

"At the buoy we had a lead of about 30 seconds, and once more, after rounding the buoy, Frank Freeman ran out on the main-boom, as he had done the day before, casting off the reef points as he went, and the reef earings as he came back. Under whole sail we flew for the finish, and crossed a winner by 26 seconds on actual time, in one of the best races I ever sailed."

The times:

Name	El. Time	Cor. Time
Iris	1:22:45	1:22:39
Dolly III	1:23:11	1:23:11
Virginia	1:28:00	1:27:33

Third Race, August 18th

This race was given under the direction of the Fall River Y. C., the start being off that club's station at Fall River, and the weather turn off the coal mine on Rhode Island, eight miles down the river. The wind was Southeast, allowing a long hitch, with a few short ones, and a broad reach home.

The channel at Fall River lies on the east side of the stream, while on the west side is shoal water, on the Borden flats. Iris early took the lead. Her skipper had decided to cut across the flats, and proceeded to do so, while the other boats worked the deeper water of the channel. Iris was hailed by Dolly, and asked if she should not go on the channel side of the buoys. Iris at once bore off, and ran down to Ina, hailing and asking if she should go outside the buoys. Captain Rooks of Ina waved Iris to keep on, and she did so, as this was

Edgewood Yacht Club

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a confirmation of what Captain Crane had been told from the committee boat before the start, his verbal orders having been to "go to the coal mine buoy and return—any way you can."

Iris found less tide on the flats than the other boats met in the channel, and at the outer turn had a long lead. She finished 8 minutes 2 seconds ahead of Dolly, which was second.

After the race a protest was lodged against Iris by Bother, because Iris had crossed the flats. At the hearing held on this protest, after the match, Captain Crane showed that no specific instructions regarding buoys had been given him, in a circular or otherwise, and that he had been told from the committee boat to sail the course as he wished. The protest therefore was not sustained. The incident arose, it appeared, from the fact that circulars for the other races had stated that "all buoys shall be passed on channel side."

The times for the race:

Name	El. Time	Cor. Time
Iris	2:58:00	2:55:59
Dolly III	3:06:02	3:06:02
Virginia	3:11:55	3:09:07
Ina	3:15:38	3:09:48
Bother	3:20:46	3:09:48

FOURTH RACE, AUGUST 19TH

The Conanicut Y. C., having a station at Jamestown, opposite Newport, had the management of this race. Added interest attached to the old Iris in these waters by reason of her record there 23 years before. The boats were given a course about 12 miles long, beginning with a reach to Goat Island—the wind being Southwest—and a beat to Beavertail, a run back and a lay to the finish. There was good weight in the wind, and as the boats worked out past the Dumplings they met a strong old sea heaving in. The tide being ebb, a sharp chop resulted from the combination.

Before passing the Dumplings, Iris had worked out a lead of perhaps two minutes on Dolly III, and of considerably more over the other boats. When about a mile and a half short of the weather turn the band on the top of her mast, holding the upper peak halyard block, came off the end of the spar with a snap that sent the gilt ball above it skyward. The bolt holding the band had worked up through the wood, which was soft, the mast being new. As her peak came down on the run Iris fell off by the head. Her sail was lowered, and as the rest of the boats passed her, she tucked in three reefs, hoisted sail again by a single part on the peak, and proceeded to cover the course for percentage. With Iris out, Dolly III had an easy race. The times:

Name	El. Time	Cor. Time
Dolly III	2:30:12	2:30:12
Ina	2:40:46	2:39:12
Virginia	2:40:33	2:39:39
Bother	2:46:12	2:40:03
Iris	2:52:43	2:51:29

FIFTH RACE, AUGUST 20TH

This was sailed at Bristol, and was the only fluke in the series. A Northwesterly breeze in the morning fell streaked at noon, and when the boats got up from Newport, at two o'clock, and were started, there were signs of approaching calm. The course was to be a 5-mile run to a buoy off the United States coaling station on Rhode Island, and return. In the start Dolly, Bother and Virginia kept off for the line from the shore end, with booms to port, while Iris approached it from the flag end, with boom to starboard, and Ina, directly to starboard of her wake, with boom to port. As they cut the line Iris and Dolly came together with a smart rap, while Bother was also bumped, as she did not give way for Dolly. All five boats touched, though fortunately the wind was not strong enough for any damage to result. The situation was one of a kind familiar enough to the large class in Massachusetts Bay. In fact, Mr. Arnold of Dolly cried, when the boats came together:

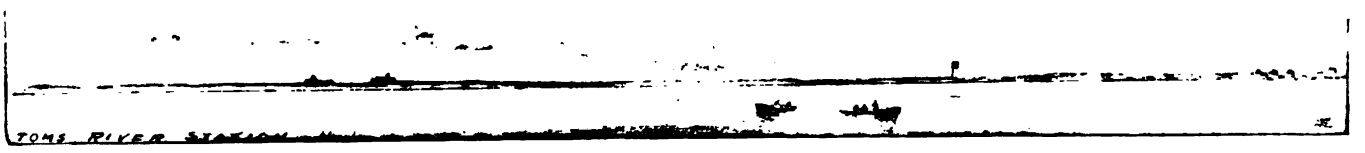
"A regular Massachusetts Bay start."

It appears the boats nearer the flag believed they had a right to room, while the leeward boat believed those nearer the flag should keep clear of her. Good humor prevailed, no harm was done, and after some ticklish work to keep booms from going through the other fellows' sails, the boats straightened out for a drift. They were all in close company until near the Popasquash buoy, where Bother dropped behind, and losing the last faint air, began to gather sternway. The others had got around the buoy, and were jibing back and forth looking for the least breath. At this time Dolly III and Iris were so close together they could not be kept from touching. Finally they drew apart, and Iris began to go astern with the tide. Dolly succeeded in fanning Southwestward along toward Prudence Island, while Ina and Virginia were fanning out toward Hog Island, on the east side of the channel, and Iris and Bother, half a mile apart, were drifting back toward Bristol.

This was two hours after the start, and they had not yet made three miles. At this point the wind came up in two directions at once. Far down the bay a Southeast breeze could be seen, while a nice crisp little breeze coming out of Mt. Hope Bay, from the Northeast, was caught by Ina and Virginia, and also by Bother, which was wisely put over toward Prudence, where Dolly lay becalmed. Holding this wind, Bother sailed past both Iris and Dolly with started sheets, and got into the Southeast wind without loss of time, and took the lead. Then Dolly got the Southeast wind, and laid a course for the turn. Meanwhile Iris lay becalmed for six minutes, being the last to get a breeze.

By the time all got the same wind the race became a procession, for all could lay a course for the turn. Bother was well inside her allowance from Dolly at the turn, and the big boat could not run her enough on the leg home to make good. The race therefore went to the littlest boat. The times:

Name	El. Time	Cor. Time
Bother	3:36:12	3:30:44
Dolly III	3:31:49	3:31:49
Ina	3:34:11	3:32:48
Virginia	3:34:53	
Iris	3:36:45	3:35:39



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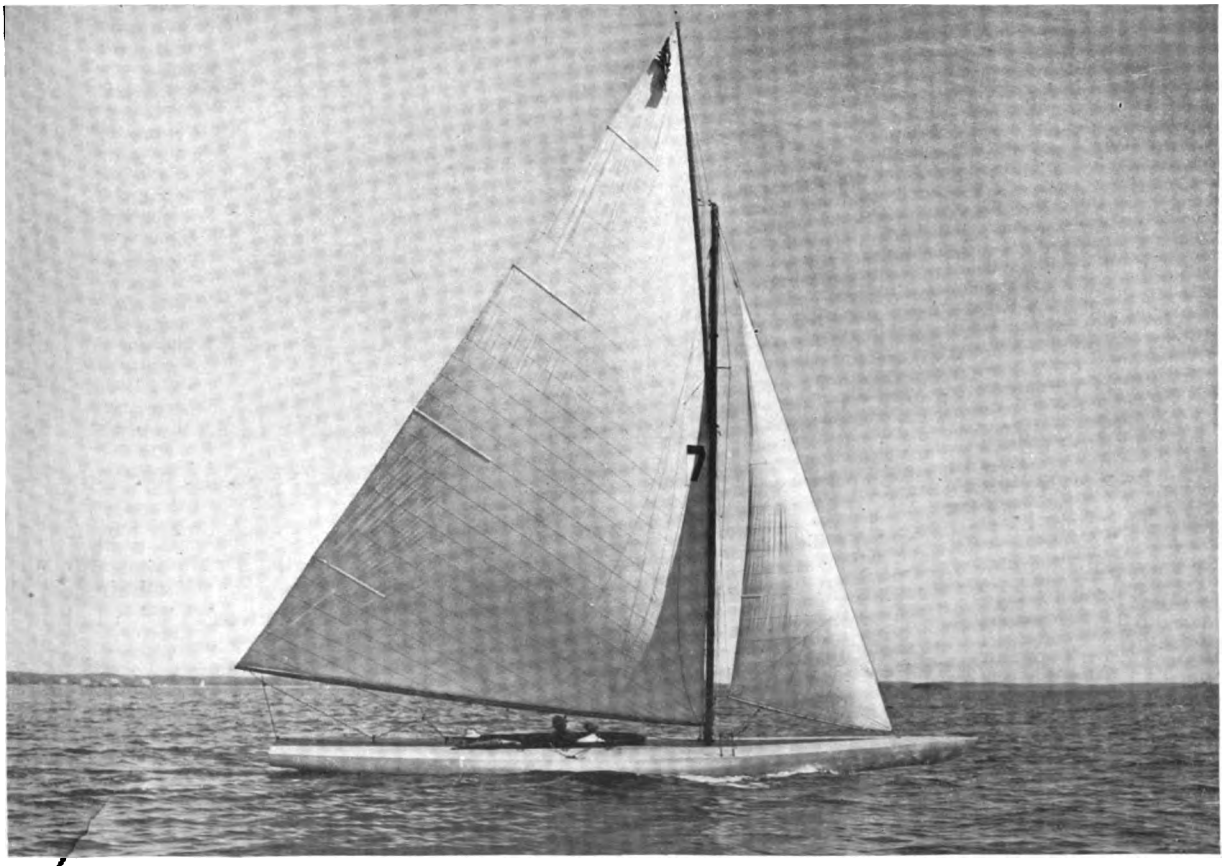
SPANISH-AMERICAN SONDER CLASS MATCH

N a fine morning in mid-August the red and yellow flag of Spain fluttered out from a staff on Abbott hall in Marblehead. It is in this hall the picture hangs that is known by the title "The Spirit of Seventy-Six." It shows an old chap with a bandage round his head, playing a fife like mad, with another old fellow and a boy beating a drum each, and all three marching through gore and the smoke of battle. Most Americans know the picture, for it has been often reproduced, as an inspirer of patriotic ardor. Whenever as a people we feel warlike, and long to lick somebody, trot out "The Spirit of Seventy-Six," and the eagle screams.

Marblehead is proud of the picture, proud of Abbott hall, proud of its country's history, and proud of its yachting eminence. So when the red and gold of Spain fluttered from Abbott hall tower in token of the sonder class match between Spanish and American boats, the Marbleheaders said, "Well, I declare; who'd have thought it," or words to that effect. They had in mind the summer of 1898, when the picture in the hall was worked harder than at any time in recent history—the year of our invasion of Cuba, to the discomfiture of Spain. A good deal had happened in twelve years, and Marblehead got the fact exactly in focus when the yellow and red flag went up, showing that we generally get a clear view of things when they come right up to the foot of our own lawn and invite our consideration. Spain had forgotten the war and its hard feelings shortly after the incident was closed. She has too much of a past to cherish such little grudges as a modern war might have left. It was the sped arrow with her, and having Spanish philosophy, she let it go and turned her attention to other matters, including sport.

The young king coming to the throne had marked the



Harpoon Winner of the President Taft Cup Owned and Sailed by Charles Francis Adams 2d

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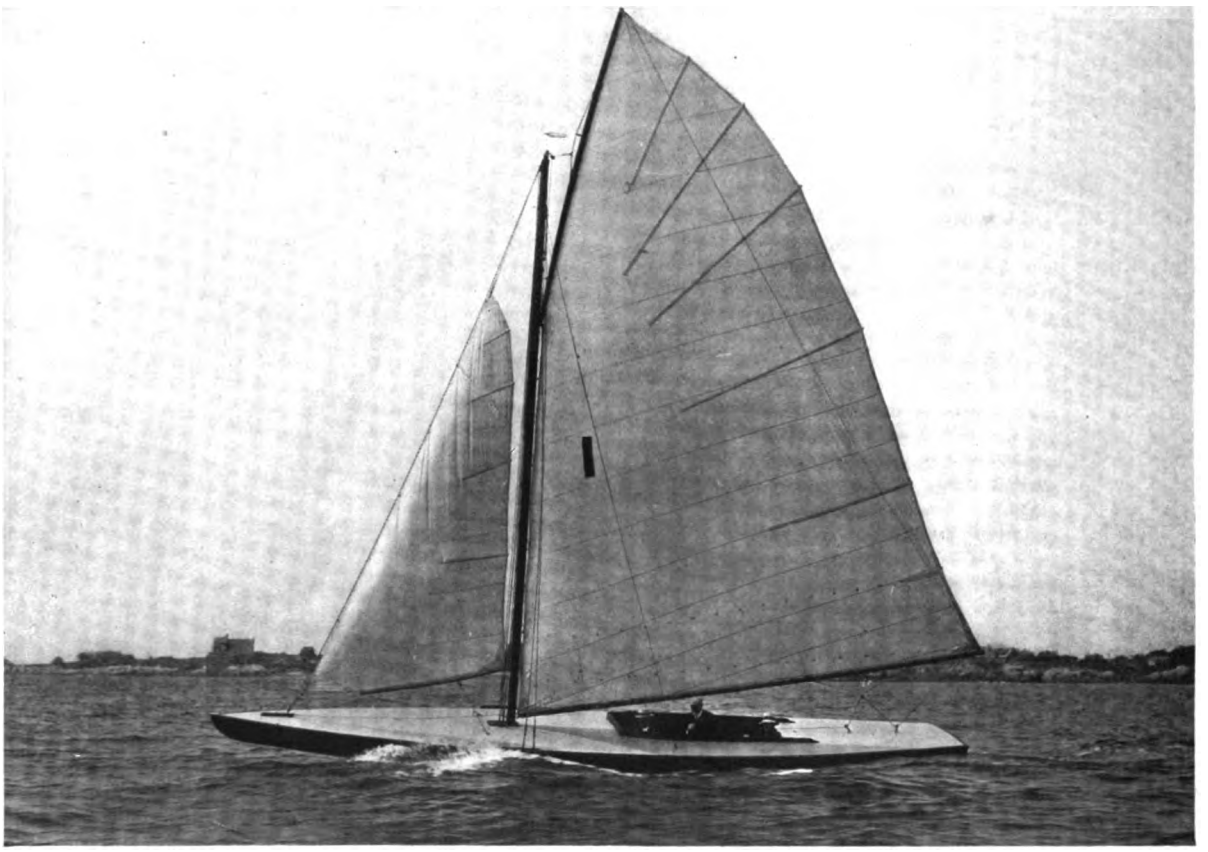
entry of Spain into modern sport, including yachting. Alfonso seized on the sail with enthusiasm, and following the example set by the German Emperor, became an active patron of yachting and yacht clubs. The result was the creation, out of nothing, of yachting in Spain. The Germans had been but a decade or so ahead of Spain in the same field, and they made the Spaniards welcome at Kiel as soon as they were ready to come. They also made other nations welcome, among them being ourselves. German yachts of the sonder class raced at Marblehead in 1906. We sent a team to Kiel for a match in 1907.

These events suggested a rapprochement between America and Spain, to take place in the form of a yachting meet. The meet was arranged to follow that at Kiel, and was carried out as arranged. The visit of the American boats to Spain led as a matter of course to arrangements for a return match, to be sailed off Marblehead. As the Germans were booked for a similar match in 1909, the date for the Spanish match was set for 1910. There the matter rested until after the German match, when details as regards rules, dates, etc., were taken up. The dates first agreed on were for the first week in September, but the Spanish yachtsmen finding this interfered with their home dates in September, asked that the match be put forward to the middle of August, with the first race on the 17th. This was cheerfully done. Meanwhile the Spanish yacht clubs, but recently formed into a central body, or federation, had selected their boats. (The federation includes the Real Club de Regatas of Alicante; the Real Club de Regatas of Santander; the Real Club Nautico of Bilbao; the club Maritimo del Abra of Bilbao (las Arcnas); the Real Sporting club of Bilbao (Portugalete); the Real club de Regates of Cartagena; the Real club Nautico of Valencia.)

The boats selected were Mosquito II, owned by Victoriano L. Doriga of the Santander club, president of the federation; Papoose, owned by Antonio Echeguren, president of the San Sebastian club, and Chonta, owned by Luis de Arana, of the Royal Sporting club of Bilbao. The boats were shipped from Cadiz, by steamer to New York, thence by steamer to Boston, where they arrived but five days before the beginning of the match.

To select three boats to meet the Spaniards, trial races were held off Marblehead in the week beginning August 8th. There were 14 starters, in two divisions. A win in either division left a clean score, or zero for the winner, while each boat not winning was given as many points in demerits as equaled her position in the class.



Beaver, Winner of the Governor Draper Cup, Owned and Sailed by C. H. W. Foster

This system worked out well, and when the final selection was made, after a day's racing of the most promising boats, with the "dead ones" eliminated, there was no question that the committee's choice fell on the three best boats. All three were new. The boat with the best record in the trials, Harpoon, represented the sum of the experience of Charles Francis Adams 2d in the sonder class in five seasons of keen racing. The first draft of her lines was supplied by E. A. Boardman, and these were laid down in the loft and corrected where necessary by Mr. Adams and Fred D. Lawley. The design was thus a collaboration of all three, and was a distinct advance on any other boat Mr. Adams had hitherto secured for the class. The boat with the

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second best record in the trials was Beaver, from designs by W. Starling Burgess. She was a refined Wolf, of the German-American team of 1909. The third, Cima, was from Charles D. Mower's design, and was a faster boat than Mr. Mower's champion of 1909, Joyette, winner of the Taft cup in the German-American match. It may be added here that Joyette, Wolf and Ellen, the 1909 team, were all in the trials, and were eliminated before the final races. Each of the boats chosen for the team carried a different sail from the others. Mr. Adams, who has always had a good opinion of the lug rig, had a tall lug on Harpoon. There were mixed opinions as to its merits, but as the boat was first at the finish in every race in which she sailed, it proved plenty good enough. Beaver had a bat-wing sail, the leach being extended in a round roach by means of long battens. The merits of this sail were also freely discussed. By means of these variations from conventional form, Harpoon and Beaver were enabled to put on the full 550 feet of sail allowed by the rules. Cima had a conventional sail, but fell only six feet below the limit. Details of the two teams follow:

BOATS AND CREWS

Name and Date of Construction	Name of Owner and Crew of Each Yacht	Designer and Builder	Club Represented
Chonta, 1907	Luis de Arana, Real Sporting Club *Crew*—Luis de Arana, Juan de Zabala, Eduardo Astigarraga	Joaquin Ortiz de la Torre, Astilleros del Nervion, Bilbao	Real Sporting Club, Bilbao
Papoose, 1908	Antonio Echeguren, President of the Real Club Náutico, San Sebastián *Crew*—Javier Peña, Francisco Tuton, Mariano Amoedo	León Carrasco, Astilleros Karrpard, Pasages	Real Club Náutico, San Sebastián
Mosquito II, 1909,	Victoriano Lopez Dóriga, of the Real Club de Regatas, Santandér, President of the Federacion Española de Clubs Náuticos *Crew*—Manuel Corral, Juan José de la Quintana, Victoriano Lopez Dóriga	Miguel Lopez Dóriga, Talleres San Martín, Santandér	Real Club de Regatas Santandér
Beaver, 1910	C. H. W. Foster, Eastern Yacht Club *Crew*—C. H. W. Foster, W. Starling Burgess, Reginald Foster	W. Starling Burgess, Burgess Co. Ltd., Marblehead, Mass.	Eastern Yacht Club, Marblehead, Mass.
Cima, 1910	Guy Lowell, Eastern Yacht Club *Crew*—Guy Lowell, J. R. Harding, C. D. Mower	C. D. Mower, Frank Wood, City Island, N. Y.	Eastern Yacht Club, Marblehead, Mass.
Harpoon, 1910	Charles Francis Adams, 2d, Eastern Yacht Club *Crew*—Charles Francis Adams, 2d, T. Nelson Perkins, Arthur Adams	E. A. Boardman, Geo. Lawley & Sons, South Boston, Mass.	Eastern Yacht Club, Marblehead, Mass.

No.	Name	W. L. ft.	B'th ft.	D'ht ft.	O.A. ft.	Disp. lbs.	S'l A. sq. ft.
4	Chonta	20.85	6.37	4.76	33.60	5445	527
33	Papoose	21.05	5.95	4.93	34.44	5315	538
50	Mosquito II.	20.56	6.14	4.75	33.77	5135	516.5
1	Beaver	19.48	7.05	4.93	35.80	4220	544
3	Cima	19.97	7.01	5.02	36.37	4395	550
7	Harpoon	19.39	7.30	5.30	36.00	4085	550

Anticipating the story of the races, it may be said that the Spanish boats were outclassed in every way by the American. This fact was known to the Spanish yachtsmen before they came, and was taken in the best of spirit. They felt they had no chance to win, but were keen to learn what they could from the series. Their best boat, Chonta, was in her fourth season, and had received some pretty hard knocks at different times. On the voyage from Spain she was wrenched in her cradle, and when put overboard at Marblehead was found to be leaking. The leak continued through the races. All three boats in the team were far heavier than need be, in both hull and rig. They were built on the German model of four seasons before, with large midship section, sharp bow and moderate stern overhang. All three were painted white, with red bottom paint, resembling common copper. None of the three was tried out at Marblehead before the races. Chonta was under sail on August 14th for a short time in a light air, but the others did not come out until the morning of the first race. The Spanish yachtsmen were prepared for defeat, so, they reasoned, tuning up would make very little difference in the result.

In the match it was to be seen that Chonta was the best sailed, her helmsman showing himself as clever at the stick as the average skipper in the class on this side of the water. The other two boats suffered at times from poor handling, and all three from poor sails. In the first race Chonta had on a sail altogether too light, the cloth being like balloon-jib material. This was changed, but the next sail, like those on the other two visitors, was much too flat, having the same fault in this respect as the sails on the German team of 1906.

Personally the Spanish yachtsmen won golden opinions among the Americans they met at Marblehead. Although not all of them spoke English, they were never at a loss in making themselves, and the people they met, quite at ease. Besides the nine men in the crews there were in the Spanish party Eduardo de Ubao, president of the federation of Spanish yacht clubs, and his brother Enrique de Ubao, while the Spanish minister to Washington, Don Juan Riano y Gayangos, served as one of the judges, and in his official capacity attended the dinners given in honor of the occasion, one by the members of the Eastern Y. C. to the Spaniards, one in return by the Spaniards to their hosts, and one at the end of the series. A feature of these dinners was an address in Spanish by ex-Governor Curtis Guild, Jr., of Massachusetts, who served as a volunteer officer in Cuba in 1898.

The races were sailed in light weather, to which all three of the American boats were perfectly adapted. Although Harpoon finished first in each race, the other two boats of the team showed themselves nearly her match, and there was a much-debated question whether with "Charlie" Adams out of Harpoon, Beaver would not prove the best boat of the lot. As Beaver was sold before the match was over to go to Buzzards Bay, there to race in trials for the selection of a team to go to Kiel in 1911, there was a further chance to prove her worth. Cima also was expected to do better in Buzzards Bay, a few changes being made in her after the match.

The races were sailed under substantially the same rules as prevailed in the German-American match of 1909, and under the racing rules of the European Yacht Racing Union. The prizes, as in the German match of 1909, were a chief trophy known as the President Taft

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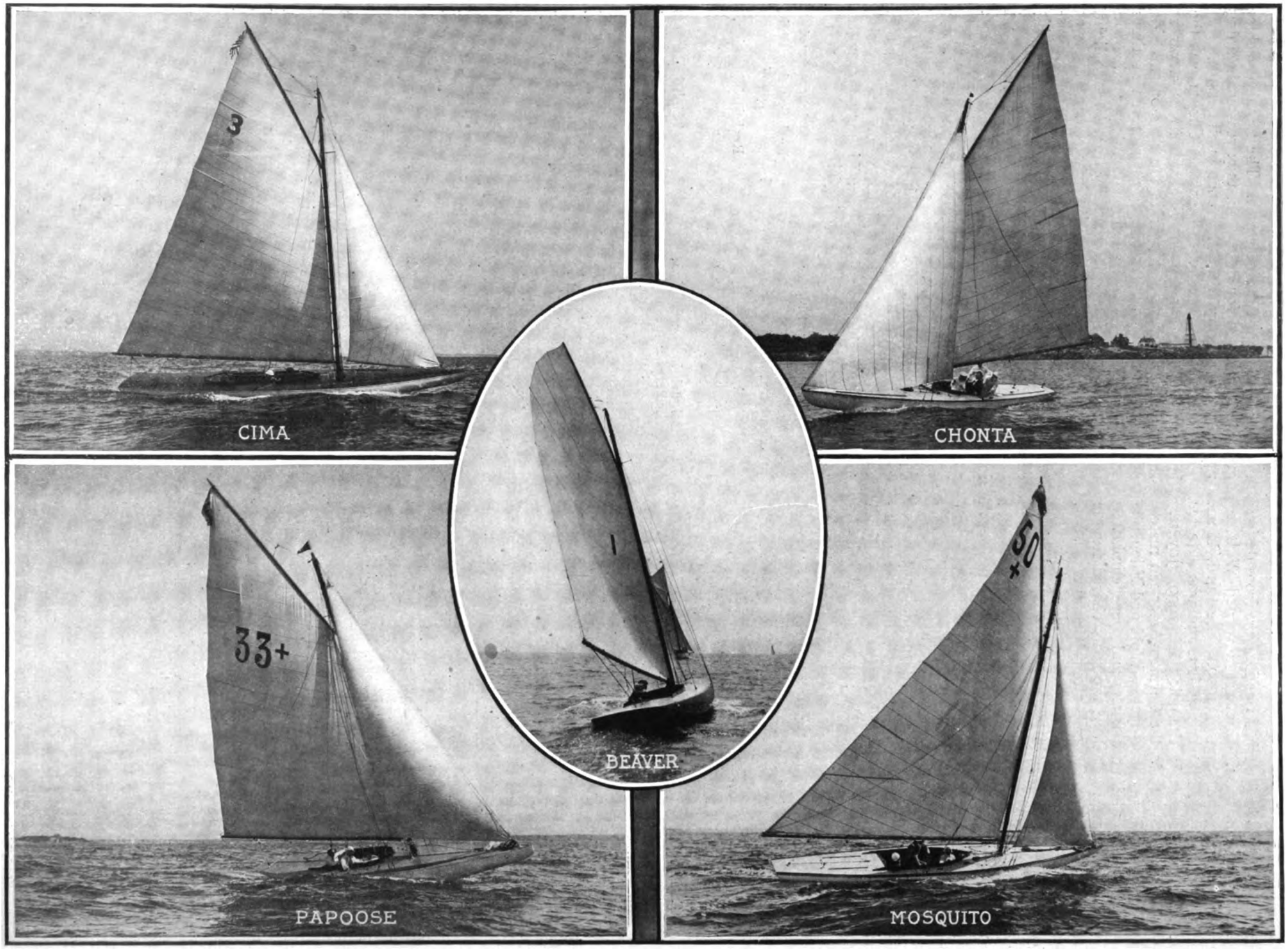

Cima and Beaver of the American Team and the Spanish Contestants Chonta, Papoose and Mosquito

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cup, to be awarded the boat that took three straight races, or the fifth race, and a second trophy called the Draper cup, for the Governor of Massachusetts, to be awarded to the boat other than the winner of the Taft cup, that should make the best showing on points, each first counting six points, a second five, a third four, a fifth two and a sixth one. There were also handsome prizes given by the Eastern Y. C. for each of the races. The details of the match are as follows:

August 17. Wind east-northeast, wholesail breeze, lightening toward the end of the race. There was a good sea on, from a hard blow the day before. The course was a six-mile triangle twice around, first leg of each round to windward. The American boats took the lead at the start, being first over, with Harpoon in the best position. The Spanish boats were from 30 to 50 seconds behind the signal. Beaver rounded the first turn 22 seconds ahead of Harpoon and 48 seconds ahead of Cima. Chonta, first of the Spanish boats, was 2 minutes 19 seconds behind the leader. Harpoon and Beaver luffed out before the end of the round, and Cima went up to first place, leading Beaver at the flag 27 seconds and Harpoon 34. On the beat of two miles that followed Beaver took the lead, with Harpoon 5 seconds astern at the turn, and Cima 49 seconds. The Spaniards were distanced. All three Americans reached fast for the next turn, where Harpoon was near enough to Beaver to attempt to cut inside at the buoy. In doing this she touched the flag. At the finish the three Americans had but 14 seconds over them from first to last, Harpoon leading Beaver by 12 seconds. Mr. Adams at once reported fouling the mark, and the race went to Beaver. The times:

Boat	H. M. S.
*Harpoon, C. F. Adams, 2d	2:03:34
Beaver, C. H. W. Foster	2:03:46
Cima, Guy Lowell	2:03:48
Chonta, Luis de Arana	2:11:59
Papoose, Antonio Echeguren	2:16:27
Mosquito II. Victoriano L. Doriga	2:21:54

*Disqualified for fouling mark.

August 18. Course windward and leeward, twice around, 10 miles. The wind was faint from southeast at the start, and strengthened to a wholesail breeze. The sea was smooth. Chonta took the start, with Harpoon second and Papoose third. In the light air Chonta did surprisingly well, turning the weather mark second, but 48 seconds behind Harpoon. Cima was third and Beaver fourth. At the end of the round Cima had second place, and Beaver third, with Chonta 13 seconds astern of her, and but 37 seconds behind the leader, Harpoon. Papoose was fifth. The second time to windward Harpoon spun out a lead, and Cima held on to second place, in which she finished. The times:

Boat	H. M. S.
Harpoon	2:25:33
Cima	2:26:39
Beaver	2:27:08
Chonta	2:28:09
Papoose	2:35:34
Mosquito II	2:46:09

August 19. The wind was fickle, veering from southwest around by the north to northeast. This gave a superabundance of reaching, though windward work was had on the third leg of each round, which was to have been a broad reach. At times the wind was fairly strong, but the finish was nearly a drift. The yachts changed places with the shifts of wind without regard to relative speed. In the start Papoose crossed too soon and was recalled. Chonta was first over, with Harpoon second, to weather of her wake, and Papoose third. All were on the starboard tack. Beaver was first around the outward buoy, Cima second and Harpoon third, with Chonta 12 seconds behind her. At the next mark Harpoon was in the lead, which she held. At the end of the round Chonta was in second place, with Cima third and Beaver fourth. The race finished with Beaver in second place and Cima third. The times:

Boat	H. M. S.
Harpoon	2:59:37
Beaver	3:03:22
Cima	3:04:13
Chonta	3:08:43
Mosquito II	3:21:02
Papoose	3:26:11

August 20. The wind was half a point East of North, a steady breeze of fair strength. The course was windward and leeward, twice around, 10 miles. The race resolved itself early into two contests, that between the American boats being close and keen. The order at the start was Harpoon, Beaver, Cima, Chonta, Mosquito, Papoose. Harpoon held down her two American rivals in the work to windward, which was close at first, and turned with 41 seconds to the good on Beaver, and 1 minute 50 seconds on Cima. Chonta was 9 minutes 33 seconds astern of Harpoon. The round ended with Harpoon leading Beaver by 2 seconds more. She gained on the second beat, and also on the run, taking the race, and the Taft cup. The times:

Boat	H. M. S.
Harpoon	2:14:30
Beaver	2:16:37
Cima	2:18:19
Chonta	2:36:47
Papoose	2:38:26
Mosquito II	2:41:14

Beaver having won 20 points and Cima 18 for the Draper cup, a race was sailed between them, with two Spanish boats also in, on Monday, August 22d. The breeze was light to moderate from the south and the course triangular. The American boats sailed a close race, never being much more than half a minute apart, and finishing with only 13 seconds between them. The times:

Boat	H. M. S.
Beaver	2:37:32
Cima	2:37:45
Chonta	2:45:24
Papoose	2:51:27

The points scored for the Draper cup were as follows:

	Race					Total Points
	1	2	3	4	5	
Beaver	6	4	5	5	6	26
Cima	5	5	4	4	5	23
Chonta	4	3	3	3	4	17
Papoose	3	2	1	2	3	11
Mosquito II	2	1	2	1	0	6

At a farewell dinner given at the Eastern Y. C. on the evening of August 21st, at which the Secretary of the Navy was present to represent the government, and the Lieutenant-Governor of Massachusetts the State, the Draper cup was presented to the winner, and the Spanish minister delivered a speech, in which he said:

> "I consider that these regattas have done a great deal toward promoting and increasing the friendship and cordial relations between the two countries, as they have afforded the occasion of establishing close personal relations, which have led to mutual understanding and lines of thought.

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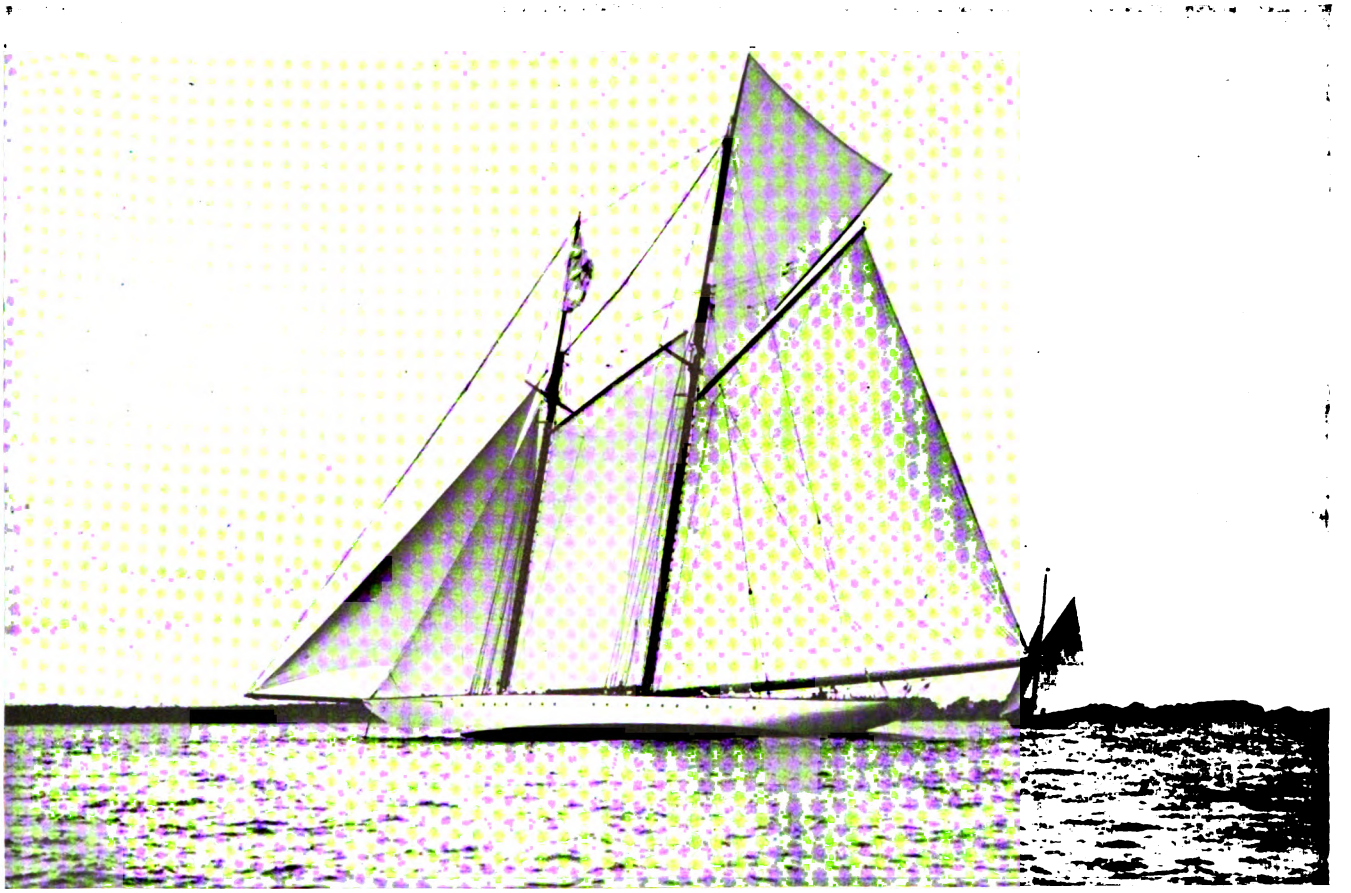

Westward, the Herreshoff Schooner Owned by Alexander S. Cochran, of New York, Which Has Been Making a Fine Record Abroad

"I think that the Eastern yacht club and the Spanish federation of yacht clubs have much to be proud of in bringing the United States and Spain closer together and I trust that the American-Spanish regatta will be an established fixture and that the American yachtsmen will give us an opportunity to welcome them again and to return the hospitality so cordially extended here.

'Yacht racing is comparatively new in Spain, but I think that, considering the few years that have passed since it was taken up, a great deal has been accomplished in a modest way and we have worked hard toward developing it.

"I am sure it has come to stay, and for this we are indebted to the interest and increasing efforts of our king, the keenest of sportsmen, whether on water or on land. And he may well be proud of the spirit with which his ideas and suggestions have been taken up and followed.

"Our Spanish yachtsmen are now in close touch with several countries where international regattas are held, and I am sure that this visit to the United States will not only be profitable to the men, but to the countries as well.

"As far as the races are concerned I may say that our admiration of the Americans' splendid boats and the way they have been sailed knows no bounds and we congratulate you upon your victory. We consider it an honor to have had the privilege of competing against you and we are proud of our defeat."

The Taft cup was presented to the winner a few days later by the President, on board the official yacht Mayflower, off the summer capitol at Beverly.

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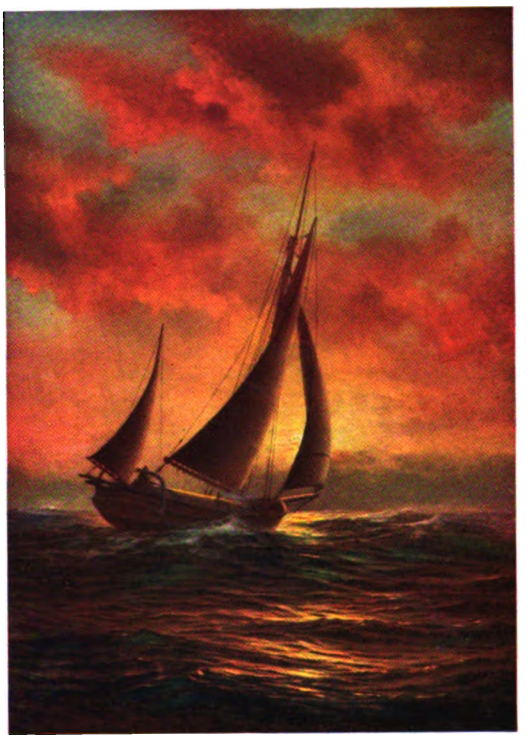

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Capt. Joshua Slocum's

Famous Sloop

SPRAY

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SPRAY

A Picture of Captain Joshua Slocum's Famous Sloop

now missing, with its skilled and adventurous owner.

PAINTED BY WARREN SHEPPARD

(The Prince of Sea Painters)

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THE RESISTANCE OF POWER BOATS AND A METHOD OF MEASURING SAME

Seth G. Malby

(Concluded)

LET us now take up the various methods of measuring resistance. The method employed by all the experimental basins now in operation is as follows: A tank or canal is first made; this of necessity must not be of a certain width or length but the dimensions must not interfere with fulfillments to be given later. This tank is filled with water. Tracks are laid along the side of the canal and a car propelled by means of motive power up and down the tank. On the car is carried the various apparatus for measuring the speed, resistance, etc. The models are then attached so that their resistance or pull back may be measured by means of the dynamometer. Guides on the model and guide rods on the car are fitted so the model is kept in line of motion; it is, however, perfectly free to move in a vertical direction. The speed is measured by noting the time between blocks at known distances apart along the side of the tank. Contact is made electrically and together with resistance the speed is recorded on the same sheet. The resistance with the speed corresponding to this resistance is gotten from these record sheets and the results plotted. It is necessary to get the results for several speeds so that you will have a complete curve. This method of measurement is absolute and does not depend on any previous performances.

We have another method, however, which is not absolute but which depends upon the experimental dynamometer tank or results from an actual ship for its base. This method is known as Colonel English's method of determining resistance by comparison. The method is as follows: Suppose we have from the results of trials of a ship the I.H.P. at various speeds. If we multiply the I.H.P. for any speed by the propulsive coefficient we get the E.H.P. for this speed. If we multiply the E.H.P. by 550 and divide by this speed in feet per minute we will get the resistance of the ship in pounds at this speed. Similarly we can get the resistance of the ship for any other speed and finally develop a speed resistance curve. Suppose also that we select a suitable length and make a model of our ship of which we have the resistance. Using the formula for frictional resistance and the laws of comparison and corresponding speeds, we are able to find the resistance of this model from the results obtained from the ship. This model will be known as the standard model. From the principle of moments we know that for equilibrium, that M the mass at one end of a lever times its lever arm must equal M_1 the mass on the other end of the lever arm, multiplied by its lever arm, or that for equilibrium the mass must vary inversely as the lever arms. We can substitute for mass a force and the law will still hold good. It will be seen that if we know one force and the ratio of the lever arms when equilibrium is established we will be able to compute the other force. Now having gotten our standard model it is desired to find the resistance of another model. We will place our standard model on one end of a lever arm and the model of the boat whose resistance we want to find on the other end. If we tow the models at a certain speed and adjust the length of the lever arms so that the models are balanced at this speed, and knowing this ratio of the arm and the resistance of the standard for this speed we can find the resistance of the other model by the method outlined above. In a like manner the resistance for various other speeds may be gotten. Again applying the laws of comparison and corresponding speeds and the formula for frictional resistance, we are able to compute the resistance of a ship similar to the model tested, and by the method before described get the I.H.P. necessary to drive the ship at various speeds by using the reverse process by which the E.H.P. was deduced from the I.H.P. Instead of getting the resistance of the standard model by means of the method here employed we might have gotten the speed resistance curve by use of the dynamometer experimental tank.

In comparing the two methods we see that one is absolute, the other is a comparison of a model of known resistance with a model the resistance of which we want to find. Comparing the models gives one a qualitative result, and knowing the resistance of one model we are able to compute quantitative results. There is much to be said in favor of both schemes and this will be taken up later with the discussion of the results gotten by both methods.

Colonel English's method was the one employed by

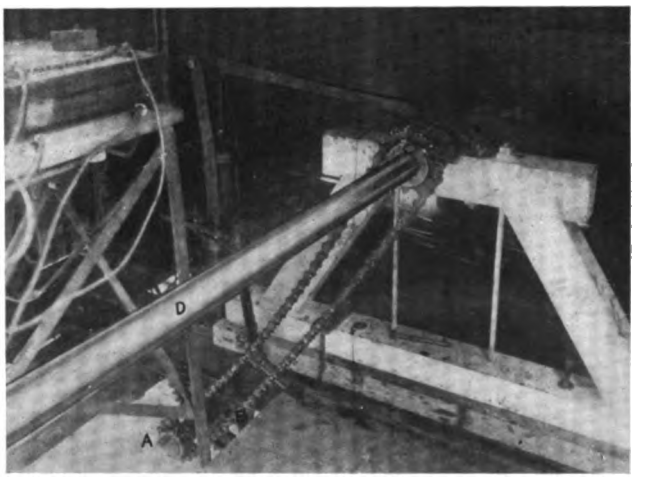

Plate No. 3

NOTE—The above thesis is the property of Cornell University.

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the author in getting the resistance curves and we will now look into the apparatus and equipment necessary to give the desired results. The history of the development will be given also, because it might aid some of the parties who now have experimental tanks where they cannot get a sufficiently high speed to make tests for the higher ratios of $\frac{V}{\sqrt{L}}$. The original apparatus at our disposal was a tank 350 feet long, 16 feet wide and 10 feet deep. The tank was equipped with the necessary tracks, car, motor to drive the car, power house, trolley, feed wires, etc. See plate No. 1. Building marked P.H. is the power house, the feed wires can be seen coming from the house. One terminal is grounded on the track, the other is connected with the trolley wire. The power house is equipped with a three-phased 15-h.p. induction motor which drives through a flexible coupling a shunt generator. This generator gives a maximum current of 25 amperes at 550 volts, the car was equipped with a 15-h.p. series motor. After a number of trials with the car at our disposal a sufficient speed could not be gotten, and so the scheme which will now be described was finally adopted. On plate No. 2 the original car is marked 1; this was placed at one end of the tank as shown. The drive on this car was by means of the front wheels, gearing being fitted between a gear on the front axle and a gear on the motor shaft. The front wheels were jacked up free of the track and the back wheels blocked. By reference to plate No. 3 an idea of one side of the car may be gotten. A sprocket A is fitted on the end of an idle shaft; gear B meshes with a gear on the motor shaft; sprocket C is fitted on shaft D; motion is transmitted by means of the chain running over the sprockets A and B. In the photograph is shown also the oil brake which acts on the front wheels of the car. By reference to plate No. 4 the other side of the car may be seen. D is the same shaft shown on plate No. 3 and marked D. This plate shows the sheave attached to the shaft D and also drum attached to this shaft, which is fitted with a band break. Rheostat marked 131 is in series with the main supply. Rheostat E is in series with a circuit shunted around the field of the motor and is used only for the higher speeds. By reference to plate No. 1, A is an idle shaft placed at the other end of the tank. The cable shown runs over this sheave and over the sheave marked F on plate No. 4. To the bottom side of the cable is attached the car (when the name car is used from now on it is understood to mean the new car); the method of attachment is shown best on plate No. 5. A piece of heavy oak is fitted across the top of the car as shown on plate No. 1 and a bolt fitted through the plank. Loops were made in each end of the cable and these placed over the bolt. The loops were held in place by a piece of wood and a nut on the end of the bolt. The cable is ½ inch in diameter. Plate No. 6 shows the general construction of the car. The two main members spanning the tank are of pine 5 inches by 5 inches. The frame is braced longitudinally by means of the long iron rods fitted as shown on the plate. The two beams running longitudinally are 3 inches by 5 inches and the frame is further braced by means of the corner beams, which are 2 inches by 5 inches. On the ends of the main beams are fitted regular wagon wheel axles. The wheels run loosely on the axles and are held on by means of pins. The wheels are 22 inches in diameter. From the upper frame is underslung a second frame which is attached to the upper frame by six uprights. The lower frame is made of 2 by 4-inch beams of yellow pine and is fitted together by means of angle irons and bolts. A covering is placed over this frame for convenience in getting about. By reference to plate No. 5 the details of the apparatus may be seen; No. 1 is the towing bar. No. 2 is the frame carrying the centers. The centers slide back and forth in the slot shown in the towing bar. Nuts are fitted in No. 2 which fit the screws 3, 3; on the ends of screws 3, 3 are fitted sprockets 4, 4, which connect with another sprocket 6 through a chain. Sprocket 6 is attached to a shaft at the other end of which is the crank 7; 5, 5, 5, 5, are the jaws that clamp the towing bar and keep it from moving when crank 7 is turned. The jaws are held together by elastic bands. Bar 8 connects the jaws on either side and by pushing down on this bar the jaws are spread apart and the towing bar is free. 9 is a scale for measuring the length of the lever arms,. 10 is a pointer which coincides with centers position, 13 is a level on the towing bar, and 14 is a weight to balance the weight of the bar when the centers are in the position shown. 11, 11 are the towing rods which project downward. These rods are provided with an adjustment so that they can be either raised or lowered. The models are here shown in position. 15, 15, 15, 15, are guide rods which fit in the guides attached to the model to keep them in line of motion. These rods are provided with an adjustment not only in a vertical direction but also in a transverse direction.

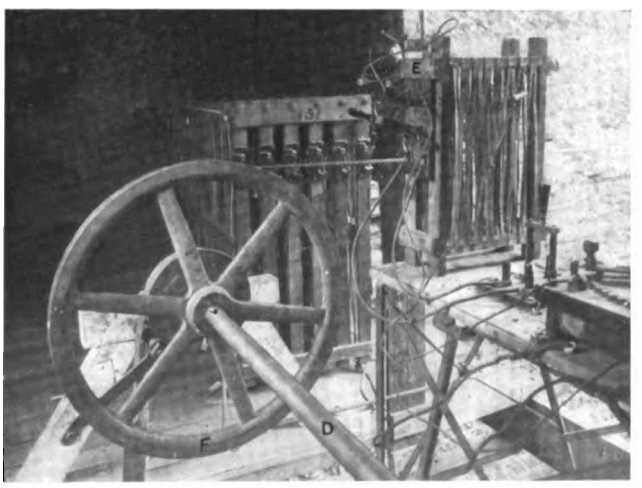

Plate No 4

Speed is measured by taking the time for 20 feet. Blocks are placed at intervals of 20 feet along the side of the tank. These blocks are covered by copper plates. The blocks may be seen on plate No. 6. Electrical contact is made between the brushes marked AB when we pass one of the blocks. In series with these brushes are placed some batteries and a chronograph. When a circuit is made current passes through a coil on the chronograph and operates an electric magnet, motion being communicated to a pen which rests on a moving strip of paper. When the circuit is made we get a jig of the pen and when broken the pen is released. By another pen is registered the time and another shows the position when the models are balanced. This last pen is controlled by the operator by switch marked 16 on plate No. 5. It will be seen that we have a complete record on one tape of everything that is necessary for

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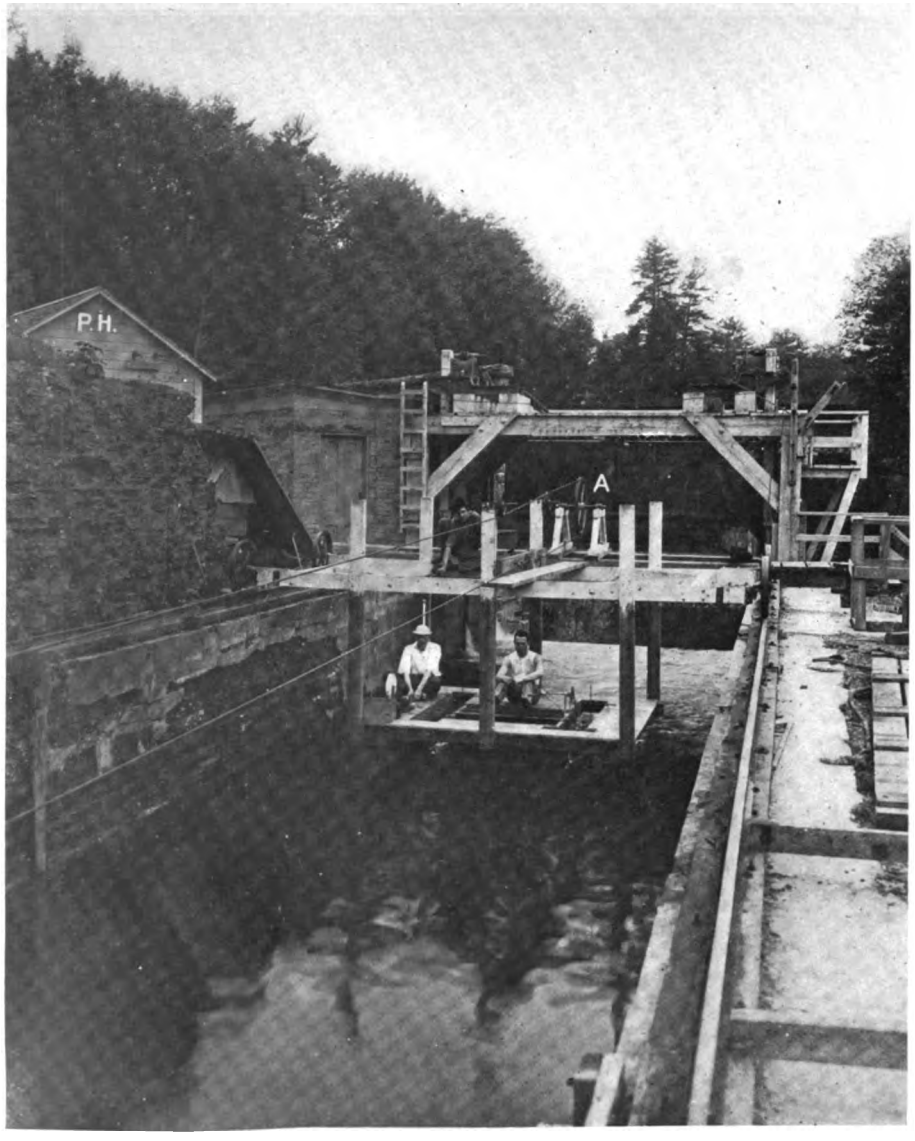

Plate No. 1

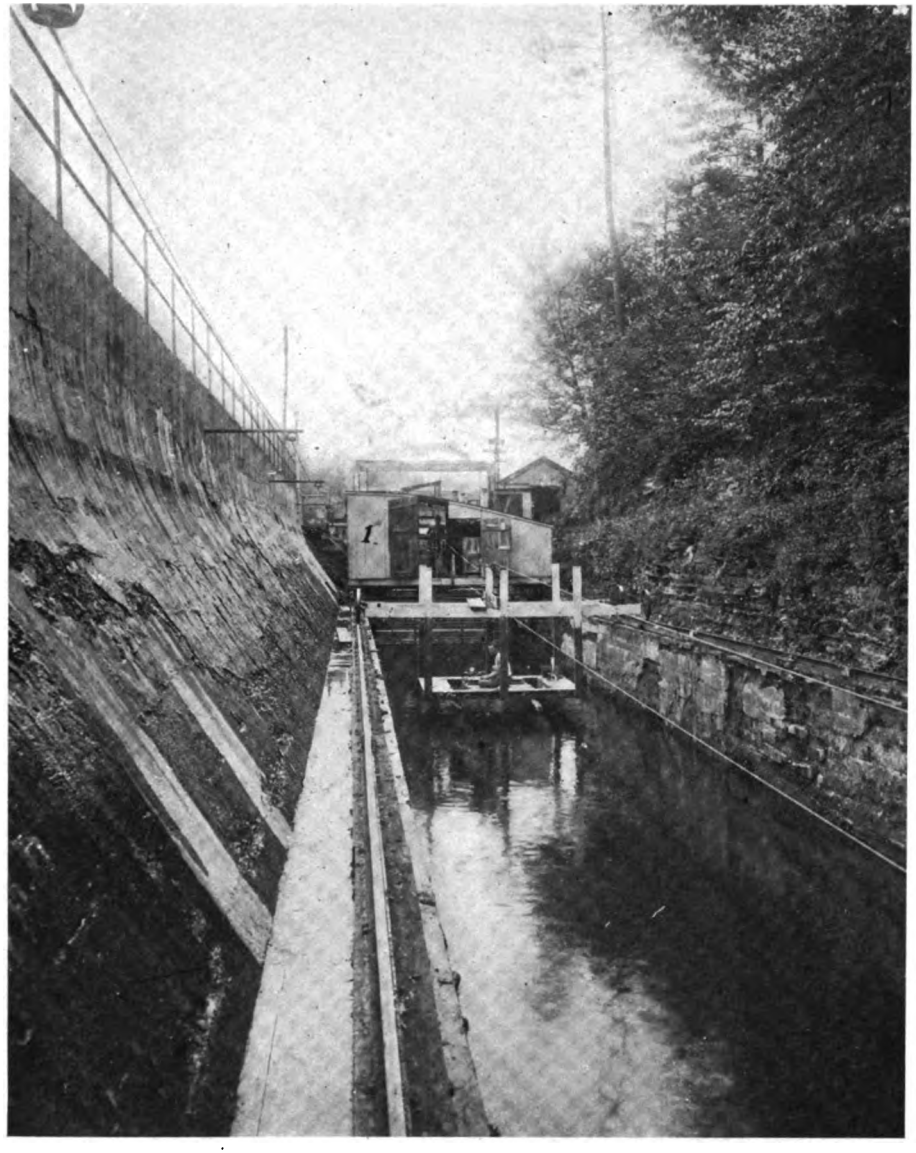

Plate No. 2

Model Testing Tank at Cornell University

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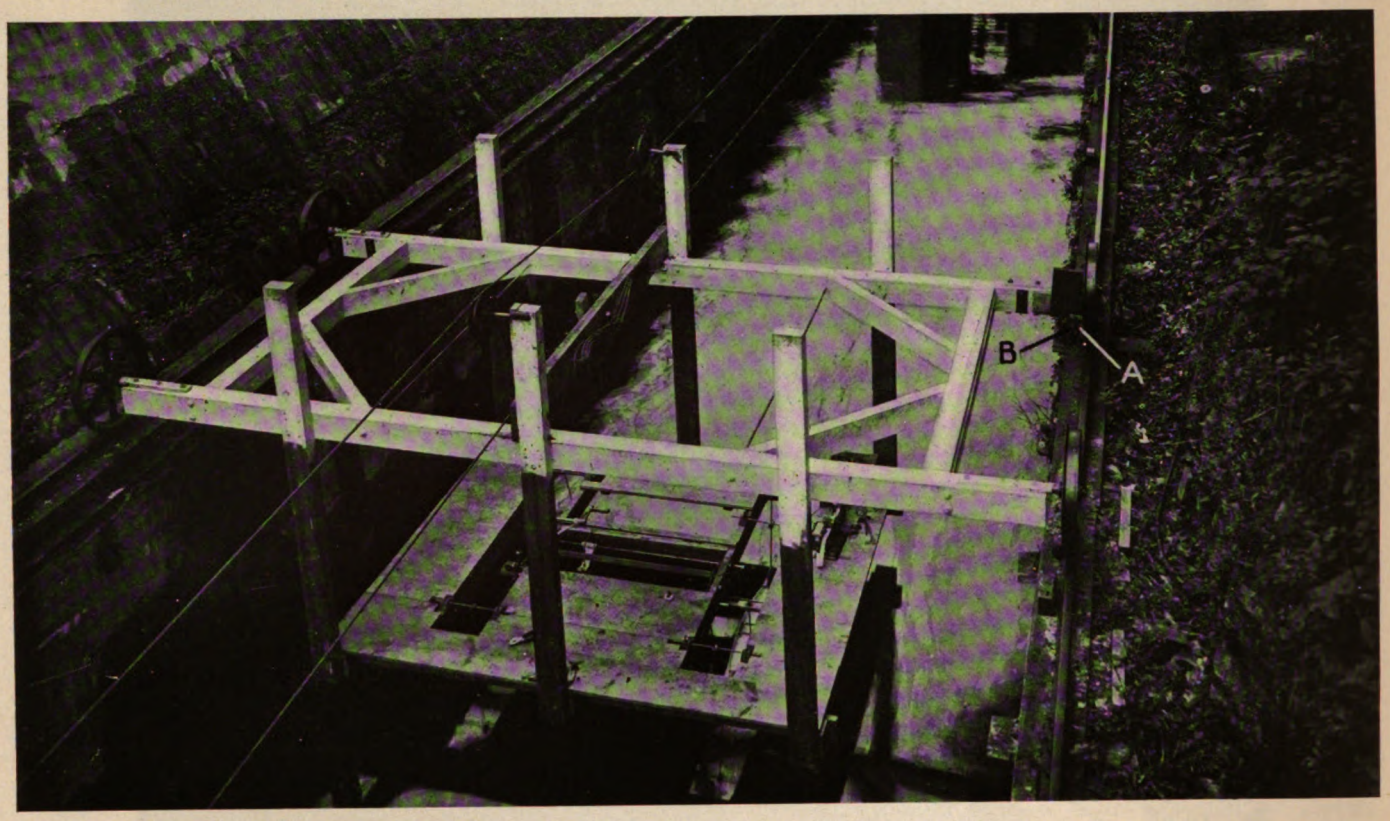

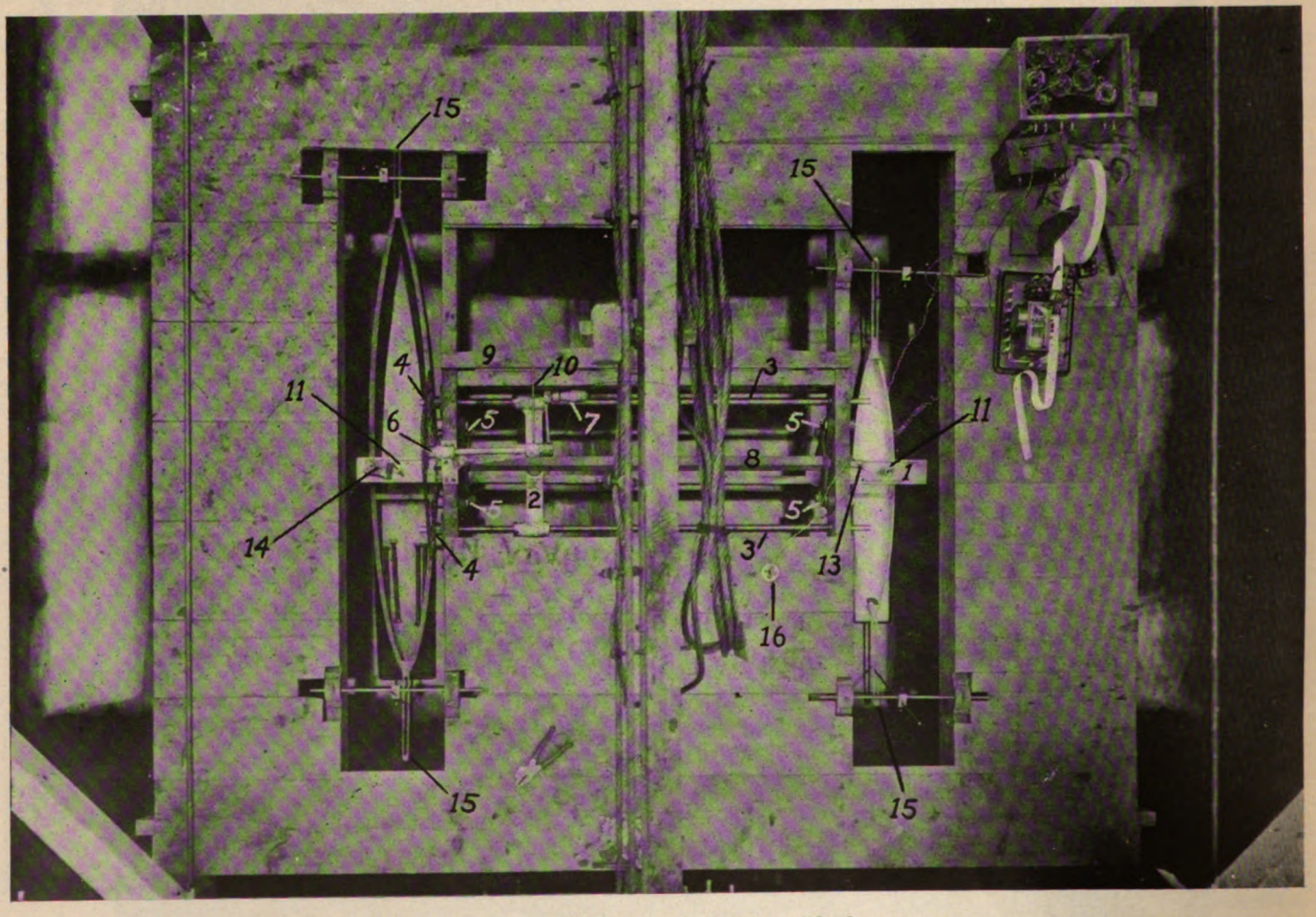

Plate No. 5—Views of Towing Platform

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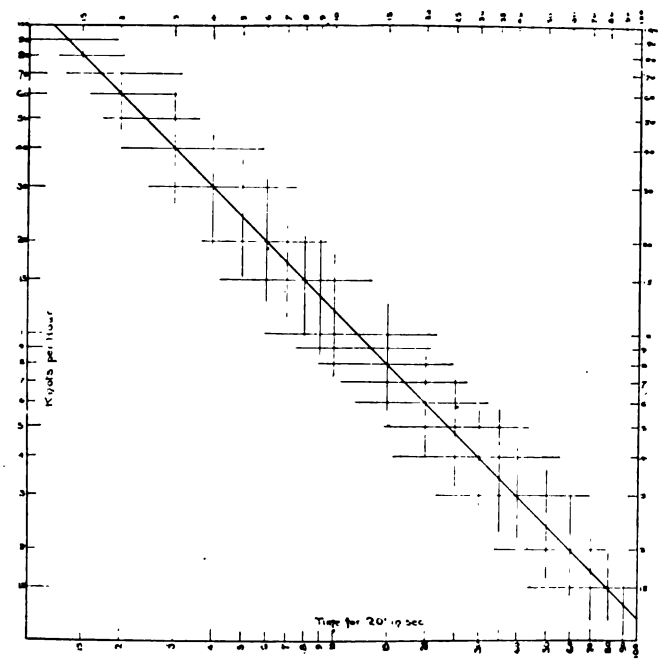
	Arm	Time for 40 ft	Speed	Ratio of Standard	Divider	Resist. Model lbs
1	15 3/4	9.75	1.18	.17	3.42	.0497
2	17 3/8	8.184	1.42	.200	3.95	.0561
3	15 3/4	10.601	1.5	.22	3.42	.064
4	16 3/8	7.608	1.54	.225	3.50	.0632
5	15	4.472	2.49	.43	3.00	.143
6	15	4.404	2.69	.48	3.00	.16
7	15 1/2	4.16	2.84	.49	3.15	.1555
8	15 3/4	3.573	3.32	.65	3.42	.19
9	16 1/2	3.44	3.42	.67	3.45	.1942
10	15 3/4	3.43	3.422	.67	3.42	.196
11	14 1/2	2.654	4.00	.84	2.88	.292
12	14 3/4	2.933	4.05	.85	2.62	.324
13	13 1/2	1.867	6.35	1.63	2.54	.642
14	14 1/2	2.42	4.85	1.11	2.88	.3855
15	13 1/2	1.896	6.4	1.64	2.54	.646
16	13	1.76	6.73	1.73	2.52	.66
17	12 3/4	1.701	7.00	1.74	2.42	.716
18	12 3/8	1.654	7.2	1.95	2.4	.812
19	14 3/4	2.522	7.8	2.04	2.85	.816
20	11 1/4	1.555	7.6	2.13	2.20	.968
21	11 3/8	1.543	7.7	2.18	2.39	.948
22	10 5/8	1.514	7.8	2.23	2.14	1.041
23	11 1/8	1.40	7.9	2.275	2.18	1.042
24	11 1/4	1.485	8.00	2.33	2.2	1.06
25	12 1/4	1.47	8.00	2.33	2.38	.979
26	11 5/8	1.456	8.13	2.39	2.32	.97
27	12	1.452	8.15	2.4	2.58	.93
28	11 1/2	1.45	8.2	2.42	2.17	1.15
29	10 5/8	1.41	8.4	2.52	2.1	1.204
30	12 1/4	1.377	8.6	2.64	2.38	.902
31	11 5/8	1.293	9.2	2.98	2.27	1.31
32	10 7/8	1.30	9.13	2.94	2.14	1.373
33	11 3/8	1.203	9.8	3.38	2.23	1.515
34	11 1/2	1.193	9.92	3.46	2.25	1.539
35	12 1/2	1.063	11.2	4.43	2.43	1.825

Sheet No. 6. 3-Ft. Model No. 1 vs. Standard 5 Ft.

working up our data, except the ratio of the lever arm. This may be read on scale 9, plate No. 5, and placed on the tape with the rest of the data. The batteries, chronograph and clock are shown in position on plate No. 5.

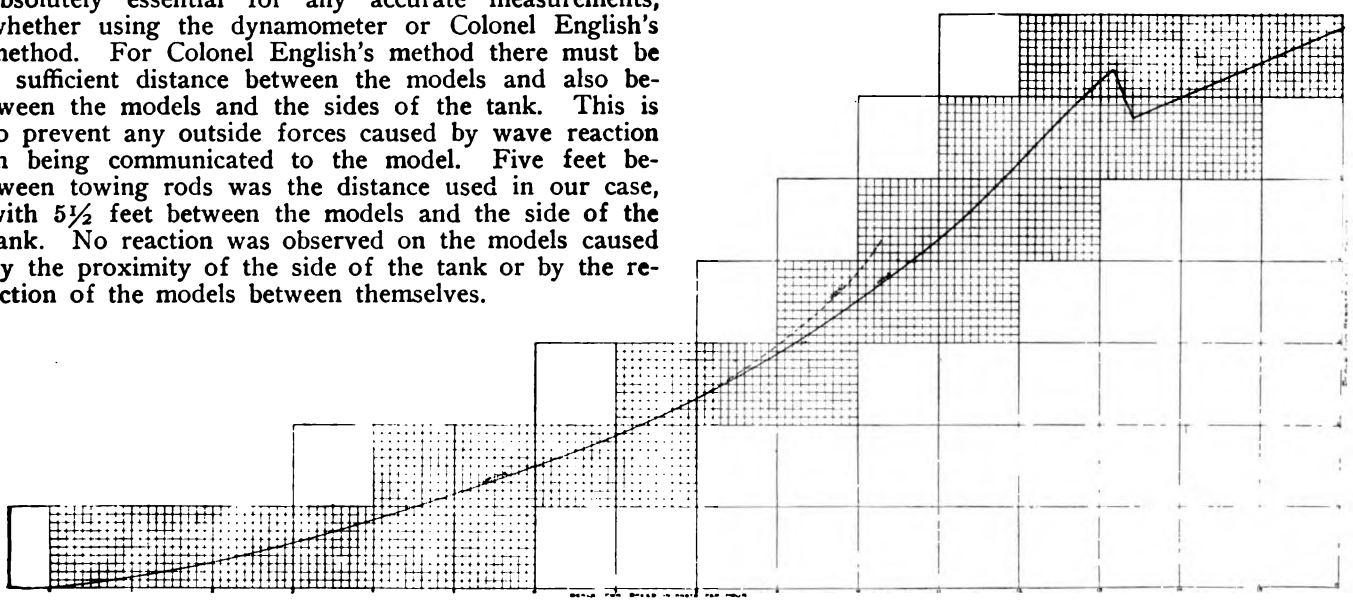
There are some general considerations which must be followed in using this apparatus. Constant speed is absolutely essential for any accurate measurements, whether using the dynamometer or Colonel English's method. For Colonel English's method there must be a sufficient distance between the models and also between the models and the sides of the tank. This is to prevent any outside forces caused by wave reaction in being communicated to the model. Five feet between towing rods was the distance used in our case, with 5½ feet between the models and the side of the tank. No reaction was observed on the models caused by the proximity of the side of the tank or by the reaction of the models between themselves.



Curve Sheet No. 14

We have now seen what resistance is, resistance as applied to power boats, and a scheme for measuring this resistance. We have now to see how this method compares as to quantitative results with experiments by use of the dynamometer.

Taking up a concrete example, a run of 40 feet at constant speed was taken as the distance for measurement. (See sheet No. 6 for results of comparison of 3-foot model No. 1 with standard 5-foot model.) Time for 40 feet was gotten by means of the chronograph and blocks before mentioned. The ratio of the lever arms is gotten on the scale before referred to. Dividing the time for 40 feet by 2 we have the time for 20 feet. On curve sheet No. 14 we have a curve of time for 20 feet plotted as abscissa and knots per hour as ordinates, therefore we can read off direct the speed, knowing the time for 20 feet. We can find the resistance of the standard model at any speed by reference to curve No. 3, or if any other model is used as standard we can find its resistance for any speed by reference to



Curve Sheet No. 3

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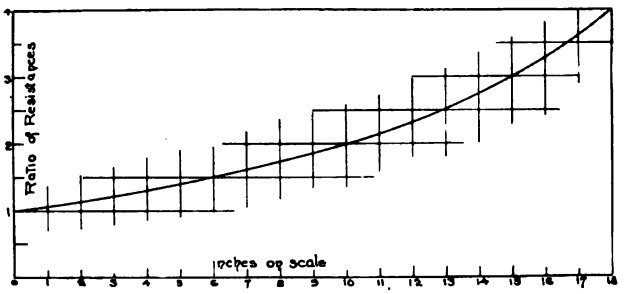


Curve Sheet No. 15

its speed resistance curve. Curve No. 15 is plotted with inches to the right or left of the center as abscissa and the ratio of the resistance corresponding to any particular setting of the bar as ordinates; knowing the resistance of one model for any particular speed we can compute the resistance of the other by multiplying or dividing, whichever the case may be, the resistance of the model used as standard for that particular speed by the ratio of the resistances. The results of experiments on 5-foot model No. 1 may be found on sheet No. 7; the curve is plotted on curve sheet No. 16. The results of the Washington test of this same model may be found on sheet No. 8; the curve is plotted on curve sheet No. 2. Results of the trials of a 3-foot model of No. 1 tried against the standard 5-foot model may be found on sheet No. 6; results of trial of a 3-foot model No. 1 tried against a 5-foot model of No. 1 may be found on sheet No. 9, curve on curve sheet No. 17. Results of trials of 3-foot model No. 1 tried against 3-foot standard model may be found on sheet No. 10, curve on curve sheet No. 18. The results of the test of the 5-foot model No. 1 reduced to 3 feet may be found on sheet No. 12, curve on curve sheet No. 20.

The results of the trials of the standard 3-foot model against standard 5-foot may be found on sheet No. 13; curve on curve sheet No. 7. Results of trials of standard 3-foot model against 5-foot model No. 1 may be found on sheet No. 14, curve on curve sheet No. 21.

Speed	Res. of 5ft Model	Residual Resist.	Corresponding speed of 3ft Model	Resid. Res of 3' model	Frictional Resist.	Total
3	.42	.174	2.32	.0258	.0767	.1225
4	.65	.233	3.10	.0613	.1302	.1915
5	.97	.34	3.90	.0894	.196	.2854
6	1.3	.421	4.70	.111	.2775	.3885
7	1.7	.34	5.42	.142	.366	.508
8	2.19	.725	6.2	.191	.475	.648
9	2.79	.969	7.0	.252	.571	.823
10	3.47	1.25	7.75	.329	.69	1.019
11	4.22	1.565	8.52	.412	.816	1.228
12	5.20	2.12	9.30	.558	.963	1.521

For 5' model
$f = .013267$
$A = 25$
$fA = .03317$
$\Delta = 7.61$ lbs.

For 3' model
$f = .01648$
$A = .9$
$fA = .0148$
$\Delta = 1.645$ lbs.

For 3' model
$f = .01648$
$A = .99$
$fA = .0163$
$\Delta = 2$ lbs

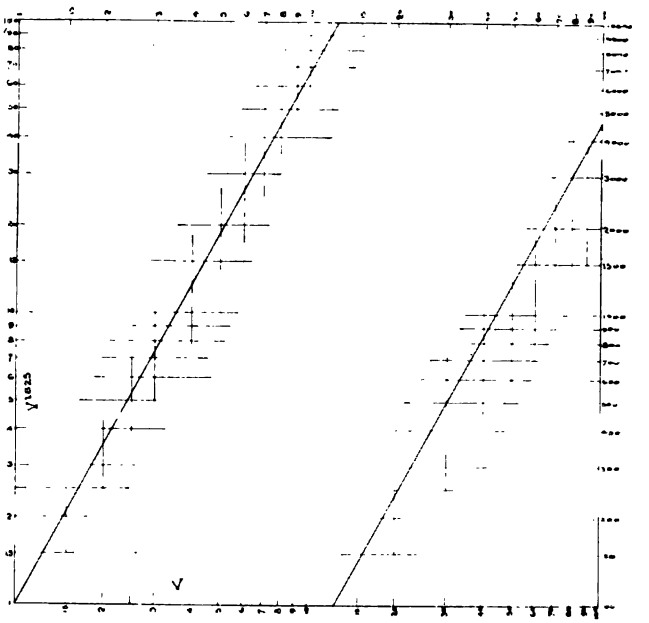
$A = C\sqrt{\Delta l}$

$C = 19.12$

$\Delta = \frac{3}{2240}$

$l = 3'$

Sheet No. 11. 5-Ft. Model No. 1, Reduced to 3 Ft.

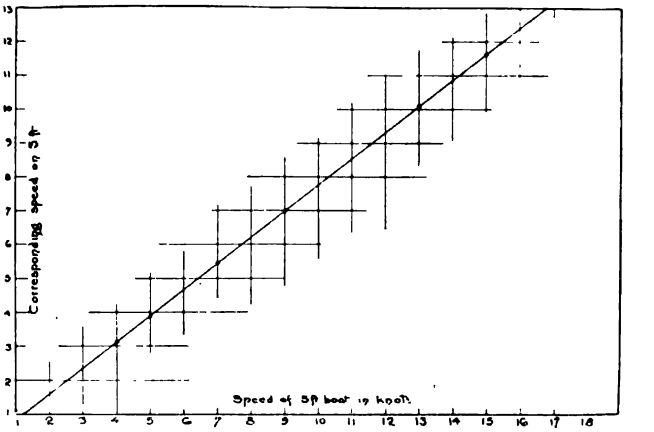


Curve Sheet No. 25

Washington results of the trial of 5-foot standard model reduced to a basis of 3 feet may be found on sheet No. 22, curve on curve sheet No. 22. Washington trials of a 10-foot model No. 1 may be found on curve sheet No. 23. The results of trials on model No. 2 may be found on sheet No. 16.

By reference to curve sheet No. 13 we find the resistance curve for the 3-foot model of No. 1 plotted from five different sources; namely, reduced from Washington trials on the 5-foot model; reduced from our trials on 5-foot models; trials against 5-foot model No. 1, against standard model 5 feet and standard model 3 feet.

The method of reducing the resistance curve of 5-foot model No. 1 with a displacement of 7.61 lb to 3 feet with a displacement of 2 lb is as follows: We first compute the frictional resistance for the 5-foot model. Curve No. 25 will be found useful in getting V to the 1.825 power. Subtracting the frictional resistance from the total resistance we get residual resistance. A, the wetted surface of the model, is found by expanding the underwater surface and intergrading same; f, we have from the results of other experiments. In similar ships the wetted surface will vary directly as the square of any of the linear dimensions. In this way we find the



Curve Sheet No. 27

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	Arm	Divider	Time for 20 ft	Speed	Resist of Stand. 5 ft Model	Resist of 5 ft Model
1	3.5	1.26	3.214	3.67	.73	.579
2	4	1.3	3.213	3.68	.74	.569
3	3¼	1.44	2.715	4.34	.94	.6525
4	2¾	1.2	2.643	4.45	.98	.817
5	2.75	1.2	2.478	4.8	1.1	.916
6	2⅝	1.099	2.319	5.1	1.19	1.804
7	2¼	1.16	2.118	5.6	1.36	1.172
8	1⅞	1.13	2.036	5.72	1.4	1.24
9	2⅛	1.15	2.05	5.8	1.43	1.244
10	2	1.14	2.011	5.9	1.465	1.285
11	1.375	1.098	1.803	6.55	1.7	1.55
12	1¼	1.08	1.561	7.6	2.13	1.972
13	1	1.07	1.539	7.71	2.19	2.042
14	1.0625	1.07	1.61	7.89	2.27	2.12
15	⅞	1.048	1.475	8.02	2.33	2.223
16	½	1.03	1.446	8.20	2.43	2.34
17	¼	1.01	1.378	8.60	2.64	2.61
18	¾	1.05	1.387	8.6	2.64	2.49
19	¾	1.05	1.353	8.7	2.7	2.57
20	½	1.03	1.261	9.4	3.11	3.02
21	¼	1.01	1.254	9.41	3.115	3.083
22	0	1.	1.174	10.00	3.51	3.51
23	⅛	1.008	1.164	10.1	3.59	3.56
24	⅜	1.025	1.167	10.1	3.59	3.50
25	⅛	1.008	1.153	10.25	3.7	3.67
26	⅝	1.048	1.134	10.5	3.875	3.7
27	-⅛	.992	1.088	11.	4.27	4.3
28	¼	1.01	1.055	11.25	4.46	4.41
29	⅛	1.008	1.045	11.38	4.58	4.545
30	½	1.03	1.342	8.67	2.785	2.7

Sheet No. 7. Model No. 1, 5 Ft. vs. Standard 5 Ft.

5' Model { f = .013267 A = 2.5 sq. ft.
fA = .03317 Δ = 7.61 lbs.

V	$V^{1.825}$	F	Res.	Total	Cor. Speed 3 ft Model
1	1	.03317			
2	3.65	.1214			
3	7.42	.246	.034	.30	2.32
4	12.60	.417	.073	.49	3.10
5	19.00	.630	.10	.73	3.90
6	26.50	.879	.181	1.06	4.70
7	35.00	1.16	.29	1.45	5.42
8	49.20	1.465	.405	1.87	6.2
9	55.00	1.821	.509	2.33	7.0
10	67.00	2.22	.64	2.86	7.75
11	80.00	2.655	.835	3.49	8.52
12	93.0	3.085	1.19	4.27	9.30
13	108.0	3.58	1.66	5.24	10.08

Sheet No. 8. Washington Test of 5-Ft. Model No. 1

	Arm	Time for 40 ft	Time for 20 ft	Speed Kts 1 hr	Resist 3 Model lbs	Divider	Resist 3 Model lbs
1	11½	8.714	4.357	2.73	.39	2.25	.173
2	12⅝	8.022	4.011	2.95	.42	2.45	.171
3	12½	5.512	2.756	4.30	.74	2.66	.278
4	12	5.398	2.699	4.40	.78	2.33	.334
5	12⅜	5.274	2.637	4.50	.81	2.66	.304
6	11½	4.992	2.496	4.76	.86	2.30	.374
7	12¼	4.738	2.369	5.00	.97	2.38	.408
8	11⅝	4.152	2.076	5.70	1.17	2.27	.515
9	11½	4.160	2.080	5.72	1.21	2.20	.55
10	12⅛	4.100	2.050	5.80	1.24	2.40	.517
11	12½	3.568	1.784	6.66	1.53	2.38	.633
12	11½	3.366	1.683	7.50	1.72	2.25	.765
13	12	3.260	1.630	7.50	1.84	2.33	.79
14	10¾	2.912	1.456	8.20	2.30	2.12	1.08
15	11⅛	2.870	1.435	8.22	2.32	2.18	1.063
16	11	2.822	1.411	8.40	2.42	2.16	1.12
17	11½	2.796	1.398	8.42	2.43	2.20	1.105
18	10⅝	2.770	1.385	8.60	2.54	2.14	1.18
19	10½	2.682	1.341	8.80	2.66	2.08	1.28
20	10½	2.590	1.285	9.20	2.92	2.03	1.4
21	10⅜	2.548	1.274	9.25	2.95	2.06	1.43
22	11⅛	2.520	1.260	9.41	3.06	2.18	1.40
23	10¾	2.470	1.235	9.60	3.19	2.03	1.55
24	13	2.396	1.198	9.85	3.36	2.53	1.33
25	13⅜	2.314	1.157	10.20	3.61	2.70	1.335
26	13⅛	2.306	1.153	10.30	3.68	2.55	1.44
27	12½	2.180	1.090	10.90	4.15	2.38	1.74

Sheet No. 9. 3-Ft. Model No. 1 vs. 5-Ft. Model No. 1

	Arm	Time 4 ft	Time 2 ft	Speed Kts	Resist Std 5'	Divider	Resist Dixie 3'
1	1	6.975	3.487	3.38	.232	1.06	.209
2	½	4.528	2.264	5.26	.458	1.03	.445
3	0	4.032	2.016	5.88	.55	1.	.55
4	0	3.576	1.788	6.30	.62	1.	.62
5	0	2.636	1.318	9.00	1.16	1	1.16
6	-½	2.612	1.306	9.13	1.18	x1.03	1.21
7	-1	2.385	1.198	9.90	1.24	x1.06	1.31

Sheet No. 10. Model No. 1, 3 Ft. vs. Standard 3 Ft.

3' Model { f = .0148 A = .9
fA = .0148 Δ = 1.645 lbs

V	$V^{1.825}$	F	Res	Total	Residual Resist	Frictional Resist	Total
232	4.7	.0767	.009	.0857	.0074	.0695	.0769
310	8.0	.1302	.0192	.1494	.0158	.1185	.0343
39	12.0	.196	.0262	.2222	.0216	.1775	.1991
47	17.0	.2275	.0475	.3250	.0391	.2518	.2909
5.42	22.4	.366	.0761	.4421	.0626	.332	.3996
62	28.0	.457	.0165	.5035	.0875	.415	.4925
7	35.0	.571	.134	.705	.11	518	.628
775	42.3	.69	.168	.858	.1382	.626	.7642
852	50.0	.816	.219	1.035	.1802	740	.9205
930	59.0	963	.312	1.275	.257	873	1.130
1008	77.0	1.252	.436	1.688	.359	1.14	1.499

2 lbs. fA = .0163

Sheet No. 12. Model No. 1. 5 Ft. Reduced to 3 Ft.

wetted surface for 3 feet. We can now compute the frictional resistance for 3 feet. By the law of comparison we have already seen that the residual resistance will vary directly as the mass at corresponding speeds. Curve No. 28 is plotted with speed of 5 feet as abscissa and corresponding speed on 3 feet as ordinates. Curve sheet No. 24, which is a curve of squares and cubes, will be found useful in getting corresponding curves and displacements. In the way before mentioned we find that the corresponding displacement for 3 feet of 7.61 lb on 5 feet is 1.645 lb. Having already found the frictional resistance and computing the residual resistance by the method outlined we get the total resistance of the 3-foot boat with a displacement of 1.645 lb, by adding the frictional and residual resistances. We have now to find the resistance for the 3-foot model weighing 2 lb. From Captain Taylor's formula for wetted surface we have $A = K\sqrt{DL}$ where A equals the wetted surface in square feet, D is the displacement in long tons and L the length in feet. From the results for wetted surface on the 5-foot model we can solve for K, and knowing K for this particular boat we can solve for the wetted surface for any displacement by substituting this displacement for D. In this way we find the wetted surface for the 2-lb model. We will again compute a new frictional resistance curve for

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	Arm	Time for 40 ft.	Time for 20 ft.	Speed Kts 1 hr	Resist. 5' Stand	Divider of Resist.	Resist. of Stand. 3 ft. Model
1	14½	8.412	4.206	2.80	.50	2.75	182
2	14¼	7.006	3.503	3.33	.66	2.73	242
3	14¼	5.856	2.928	4.02	.84	2.73	307
4	14	5.468	2.734	4.21	.905	2.70	335
5	13½	4.555	2.2773	5.20	1.22	2.59	47
6	13½	4.322	2.161	5.48	1.31	2.59	.506
7	13⅛	4.226	2.113	5.59	1.35	2.49	.54
8	13¼	3.918	1.959	6.00	1.50	2.55	.59
9	12¾	3.693	1.846	.642	1.65	2.43	.68
10	13⅛	3.654	1.827	6.80	1.685	2.32	67
11	12½	3.054	1.527	7.75	2.20	2.34	94
12	12¼	2.993	1.496	7.43	2.03	2.43	.838
13	12⅛	2.918	1.459	8.15	2.40	2.38	1.01
14	13¾	2.727	1.364	8.65	2.67	2.67	1.00
15	13¾	2.615	1.307	8.67	2.68	2.65	1.01
16	13¾	2.672	1.336	8.90	2.80	2.55	11
17	14⅛	2.631	1.315	9.05	2.90	2.72	1.07
18	16	2.620	1.310	9.05	2.90	3.22	90
19	14¾	2.580	1.290	9.20	2.99	2.88	1.04
20	14¾	2.497	1.248	9.50	3.18	2.75	1.158
21	14¾	2.485	1.242	9.58	3.23	2.88	1.088
22	15	2.418	1.209	9.80	3.38	2.93	1.15
23	16	2.267	1.1335	10.56	3.88	3.22	1.20
24	16	2.173	1.0865	10.95	4.22	3.22	1.31
25	16¾	2.038	1.019	11.75	4.95	3.45	1.43

Sheet No. 13. Standard Model 3 Ft. vs. Standard 5 Ft.

the increased wetted surface and find our residual resistance by the same method as outlined above. Adding the two we get the total resistance. The above data are plotted on curve sheet No. 19.

From the curves we see that there is a maximum difference of 12% between the curves at a speed of eight knots. This might be accounted for by the fact of the general instability of this model and by the fact that these models, both 3 and 5 feet, were very unfortunate in coming apart and in getting severe drops and bumps which might have caused a change in shape. It may have been this which caused the curves not to agree more closely, but probably the best explanation that can be offered is the instability before referred to and explained. A true test of the worth of the apparatus, however, may be found by

	Arm	Time for 40 ft.	Time for 20 ft.	Speed Kts 1 hr	Resist. 5 ft. Model	Divider of Resist.	Resist. 3 ft. Mod. Stand.
1	12½	5.302	2.651	4.48	.80	2.36	339
2	11½	5.279	2.639	4.48	.80	2.25	.356
3	11¾	4.734	2.367	5.00	.97	2.30	42
4	12	4.684	2.344	5.08	1.00	2.33	43
5	11½	4.624	2.312	5.10	1.00	2.25	425
6	11¾	3.903	1.951	6.08	1.34	2.23	6
7	11½	3.580	1.790	6.60	1.53	2.28	67
8	11½	3.360	1.680	7.05	1.72	2.23	.765
9	11½	3.325	1.663	7.13	1.76	2.25	.78
10	11⅝	3.182	1.591	7.43	1.90	2.28	.834
11	11½	3.130	1.565	7.61	1.99	2.25	.885
12	11½	2.818	1.409	8.40	2.42	2.25	1.07
13	11½	2.768	1.393	8.52	2.50	2.25	1.11
14	11⅝	3.696	1.348	8.80	2.65	2.28	1.16
15	11⅝	2.669	1.334	8.90	2.73	2.30	1.19
16	12	2.618	1.309	9.10	2.85	2.33	1.22
17	13¼	2.565	1.283	9.25	2.95	2.58	1.14
18	13	2.474	1.237	9.60	3.20	2.52	1.27
19	14	2.459	1.230	9.55	3.15	2.75	1.145
20	13¾	2.370	1.185	10.00	3.47	2.70	1.28
21	14¼	2.390	1.195	9.90	3.40	2.85	1.19
22	13¾	2.395	1.197	9.90	3.40	2.70	1.26
23	14¾	2.326	1.163	10.20	3.61	2.93	1.22
24	16	2.160	1.080	11.00	4.22	3.30	1.32
25	15½	2.138	1.069	11.15	4.35	3.15	1.38
26	16	2.098	1.049	11.35	4.50	3.30	1.36
27	16¼	2.073	1.036	11.45	4.59	3.36	1.36
28	14	2.422	1.211	9.80	3.32	2.75	1.21

Sheet No. 14. Standard Model 3 Ft. vs. Model No. 1, 5 Ft.

	Arm	Time for 40 ft.	Time for 20 ft.	Speed Kts 1 hr	Resist. of Stand.	Divider	Resist. of Model 3 ft.
1	15¾	7.802	3.901	3.02	56	3.21	175
2	15½	6.018	3.009	3.93	.82	3.15	258
3	14¾	5.104	2.507	4.70	1.10	2.85	386
4	14¼	4.696	2.348	5.08	1.18	2.82	.419
5	13¾	4.032	2.016	5.88	1.45	2.68	.54
6	13½	3.786	1.893	6.21	1.57	2.65	.592
7	12¾	3.695	1.848	6.40	1.64	2.50	.656
8	11¾	3.252	1.626	7.30	2.00	2.31	.865
9	11¼	3.144	1.572	7.60	2.14	2.05	1.04
10	11¼	3.018	1.509	7.85	2.25	2.20	1.02
11	9¾	2.920	1.460	8.12	2.39	1.95	1.22
12	9¾	2.724	1.362	8.12	2.39	1.97	1.21
13	9¾	2.890	1.445	8.20	2.43	1.95	1.25
14	10¾	2.900	1.450	8.20	2.43	2.12	1.15
15	13¼	2.064	1.032	11.60	4.80	2.56	2.12
16	10¾	2.876	1.438	8.23	2.44	2.10	1.16
17	9¾	2.564	1.282	9.20	2.98	1.97	1.51
18	11	2.580	1.290	9.20	2.98	2.16	1.38
19	10¾	2.392	1.196	9.90	3.45	2.12	1.63
20	11¾	2.366	1.183	10.00	3.51	2.30	1.53
21	10¾	2.286	1.143	10.40	3.80	2.14	1.77
22	10¼	2.452	1.226	9.60	3.30	2.08	1.58
23	10⅞	2.353	1.176	10.00	3.65	2.14	1.7
24	11¾	2.200	1.100	10.70	4.02	2.30	1.75
25	10½	2.318	1.159	10.70	4.02	2.08	1.93
26	12¾	1.988	.994	11.90	5.10	2.40	2.12
27	12¾	1.946	.973	12.30	5.40	2.40	2.25
28	12¼	1.942	.971	12.30	5.40	2.36	2.29
29	11¼	1.872	.936	12.60	5.80	2.25	2.57
30	15	5.934	2.967	4.00	.84	2.88	.291
31	12	3.322	1.661	7.10	1.91	2.24	.852

Sheet No. 16. Model No. 2 vs. Standard 5 Ft.

reference to curve sheet No. 12, where the results for the 3-foot model of the standard, gotten from three different sources, are plotted. In reducing the results of the 5-foot test to a basis of 3 feet, the method before described for model No. 1 was used up to the critical speed. Above the critical speed it was assumed that the models followed the law of comparison direct. These results may be found on sheet No. 15. In determining the resistance of the 3-foot model No. 1 when

Coef. applied to		For Model of length		
Model	Boat	10 ft	5 ft	% Greater
U S T	Froude	1601.4	-----	3.852
U S T	Tidman	1542.0	-----	
U S T	Froude	16635	----	4.174
U S T	Tidman	17333	----	
Tidman	Froude	1388.7	1475.2	6.225
Froude	Tidman	1650.2	1670.2	1.215
Tidman	Tidman	1459.2	1545.7	5.928
Froude	Froude	1579.7	1599.8	1.270
Assuming total res. follows the law of comparison direct		1899.5	2150.4	13.210

L	Surfaces	f. (F.W.)
40'	160	.009543
10'	10	.011287
5'	2.5	.012944
3'	.9	.015211

Sheet No. 17

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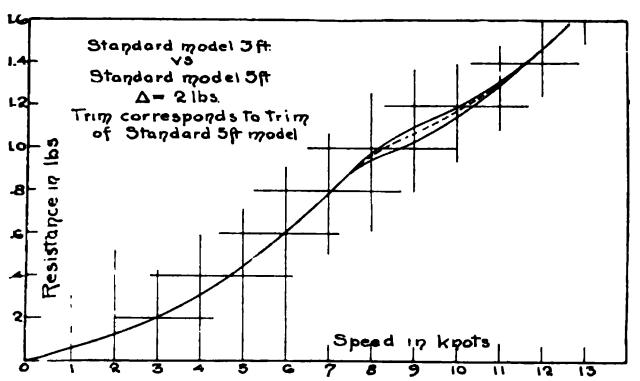
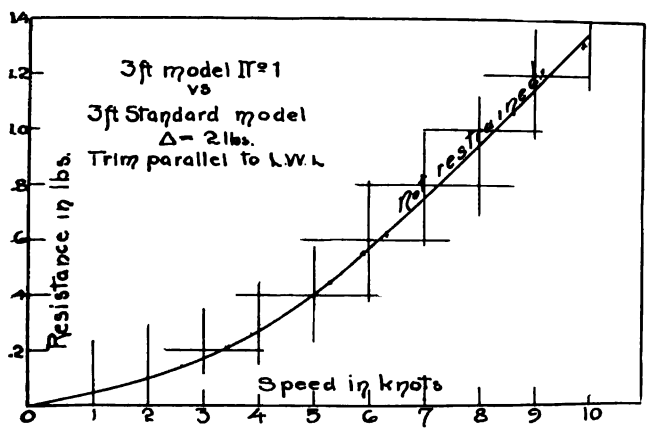
V	$V^{1.825}$	Frictional Resist.	Residual Resist.	Total	
1	1	.0388	.0912	.13	5' Model
2	3.55	.138	.177	.135	Δ = 9.25 lbs
3	7.43	.2885	.2715	.56	f = .013267
4	12.6	.4895	.3505	.84	
5	19.	.738	.422	1.16	
6	26.5	1.029	.471	1.50	
7	35	1.36	.51	1.87	
8	44.5	1.729	.591	2.32	
9	55.1	2.24	.63	2.87	
10	67	2.6	.91	3.51	
11	80.	3.106	1.154	4.26	
12	93.6	3.638	1.562	5.20	
13	108.	4.195	2.005	6.2	
14	112.4	4.363	1.627	5.99	
15	114.	4.43	1.98	6.41	
16	115.8	4.49	2.35	6.84	
Corresponding Speed in 3ft Model					Δ = 2 lbs.
1.6	2.36	.041	.0381	.0791	
2.35	4.8	.0835	.0586	1421	
3.11	8.0	.139	.0757	2.147	
3.9	12.0	.2085	.0912	2997	
4.7	17.0	.2953	.1019	3974	
5.45	22.5	.391	.1101	50115	
6.27	28.2	.49	.1279	6179	
7.	35.	.6085	.1361	7446	
7.79	42.1	.731	.1968	9278	
8.55	50.	.8695	.2495	1.1190	
9.31	58	1.025	.338	1.363	
10.1	68	1.181	.433	1.614	
10.88	79.	1.371	.3518	1.7228	1.295
11.65	88	1.529	.428	1.957	1.384 } Assuming R to vary
12.42	100	1.739	.508	2.247	1.478 } directly as the mass at corresponding speeds

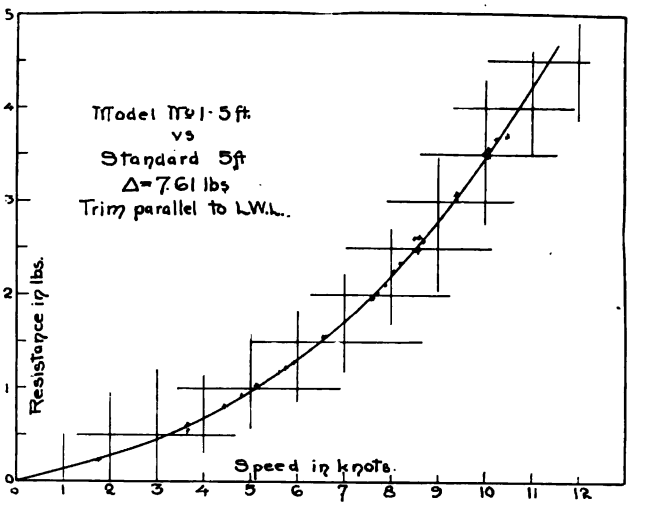
Sheet No. 22. Standard Model, Reduced to 3 Ft.



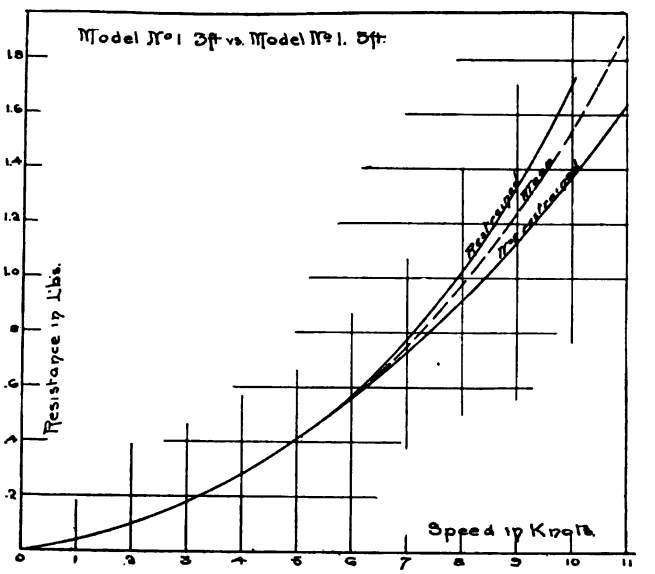
Curve Sheet No 7



Curve Sheet No. 18



Curve Sheet No. 16



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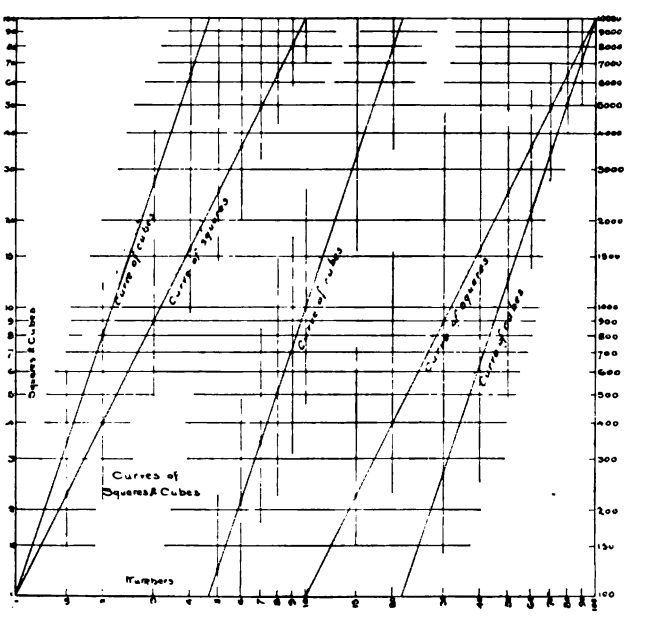

Curve Sheet No. 24

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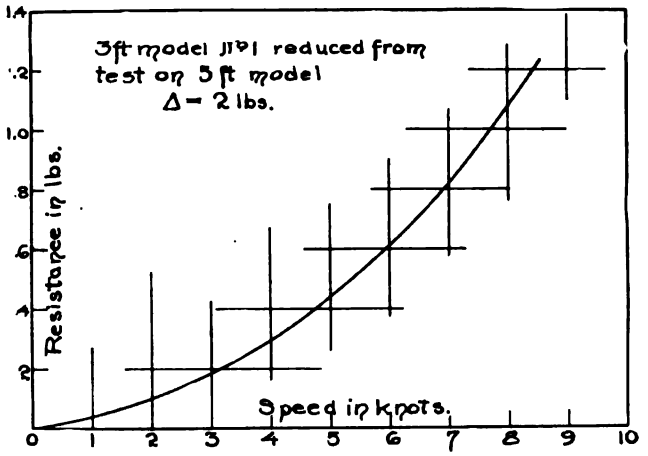

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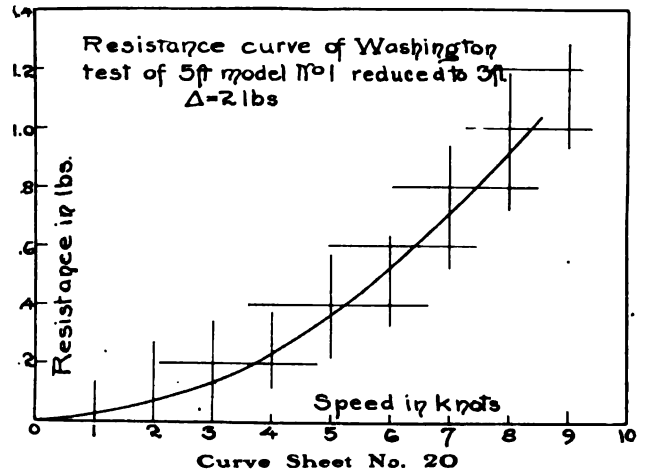

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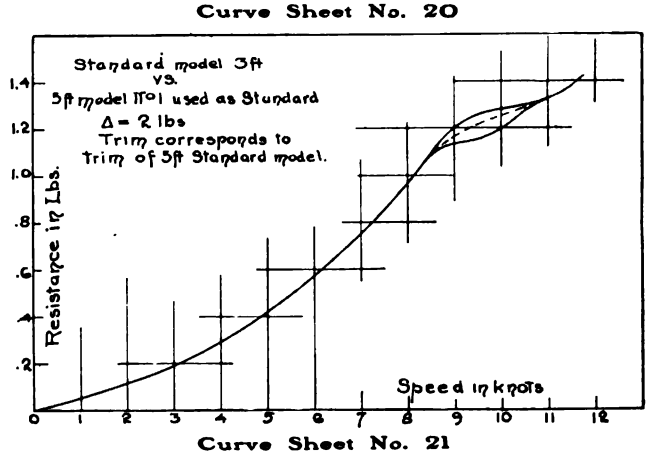

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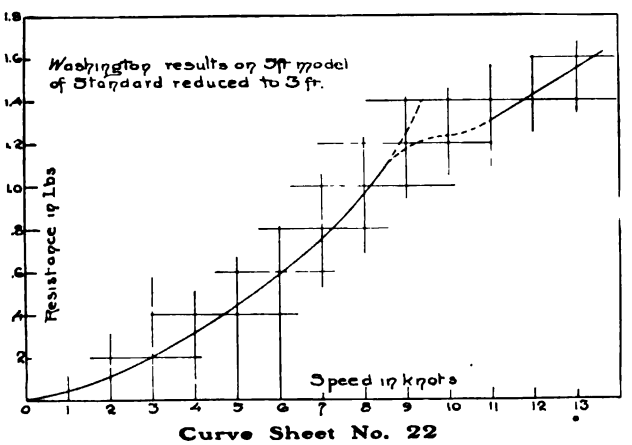

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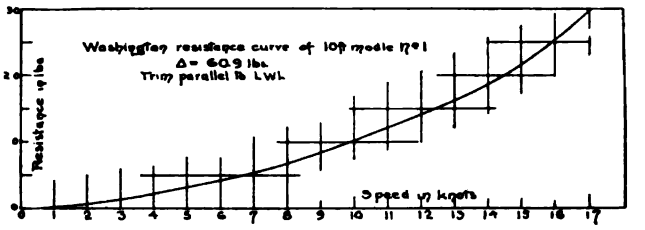
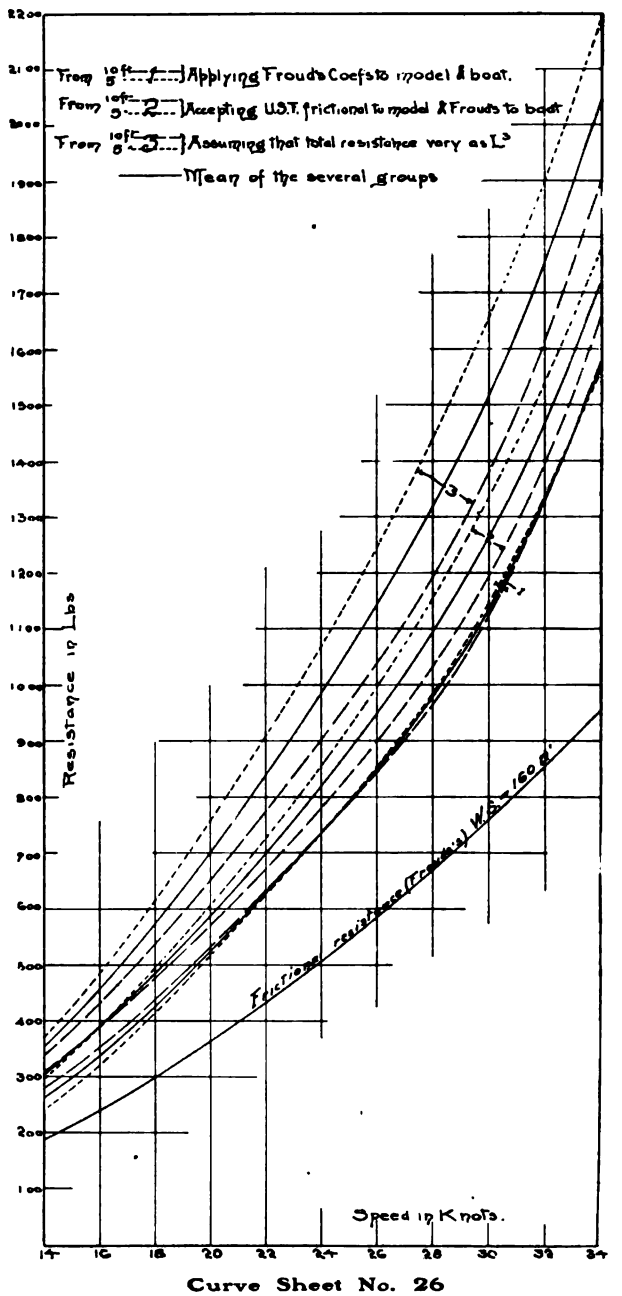


Curve Sheet No. 23

tried against the 5-foot model No. 1 the resistance of the 5-foot model as determined by us was used and not the Washington curve. We see that the three curves are for all practical purposes identical and proves beyond a doubt that this method of testing will give accurate results.

In closing a few words might be said about the use of the various frictional coefficients. On sheet No. 17 is given a table deduced from the results plotted on


From 10ft to 5 } Applying Froude's Coefs to model & boat.
From 10ft to 5 } Accepting U.S.T. frictional to model & Froude's to boat
From 10ft to 5 } Assuming that total resistance vary as L³
Mean of the several groups
Resistance in Lbs
Speed in Knots.

Curve Sheet No. 26

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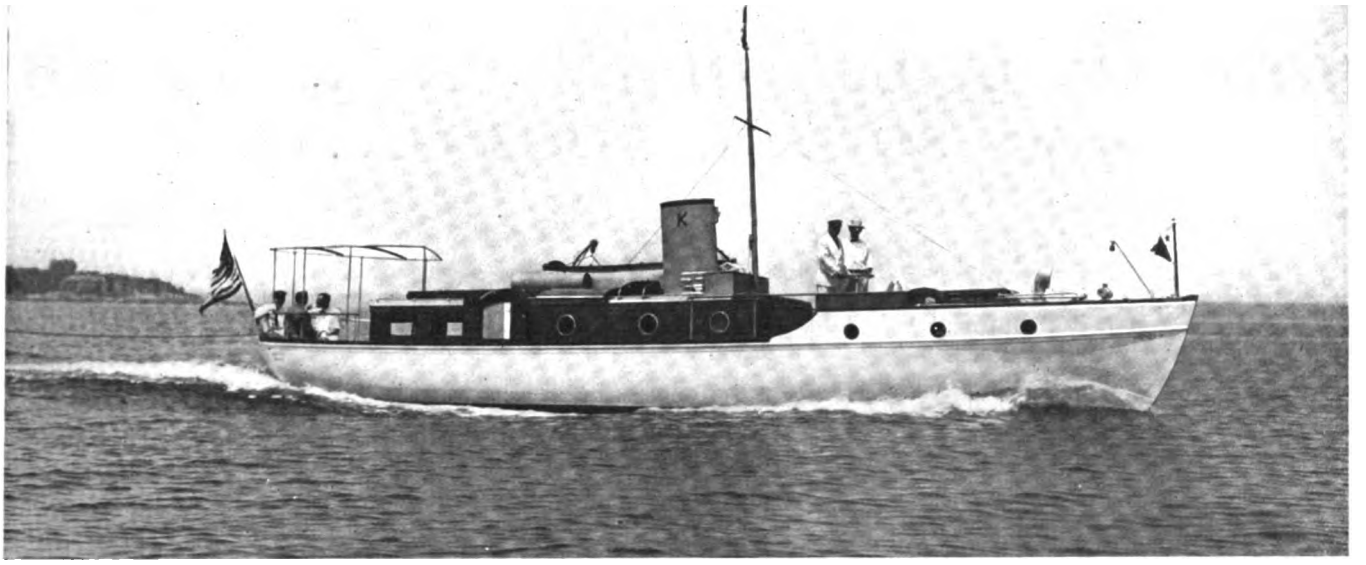
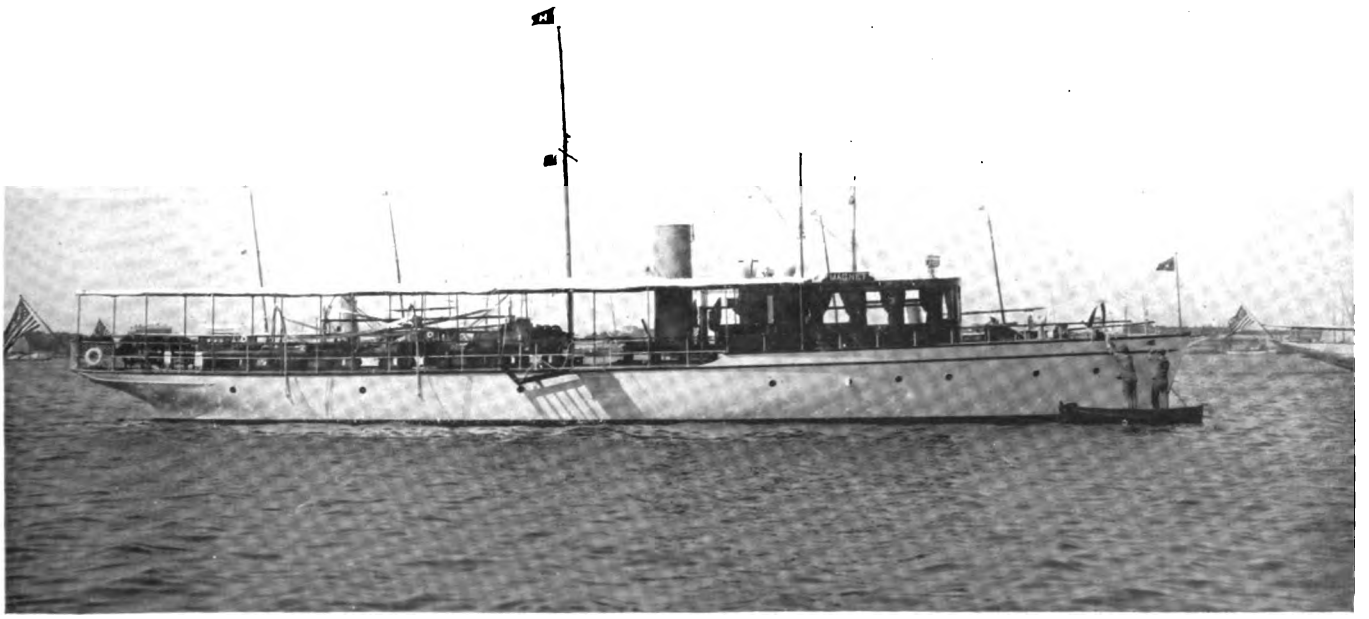


Gardenia, 48 Ft. O. A., Jager Engine. Owned by Henry F. Knowles, Boston, Mass.

curve sheet No. 26. The results of experiments on the 10-foot model of No. 1 and 5-foot model No. 1 are here given on a basis of 40 feet. We see that using Froude's coefficient for model and boats we get a difference of 1.27%, and using Froude for the model and Tidman for the boat we get a difference of 1.215%. Evidently Tidman for the boat and Froude for the model give the most consistent results, but as the limit of accuracy in this work is taken as 5%, to avoid using two different sets of coefficients we have adopted Froude for all cases.

Some hints might be useful in making the model and in the handling of the apparatus. All of the models had varnished surfaces and were made from a solid block of wood or a block made by glueing together several thin strips. A little oil mixed with the glue will make the glue water-proof. In digging out the models to get them down to weight a circular saw can be used to advantage and then the inside finished by hand. A transom is then glued or nailed on the model. As to the handling of the apparatus a certain distance should be selected where it is desired to make your observation and constant speeds gotten before reaching this point, and all observations made should be made within this distance.



Magnet, 93 Ft. 6 In. O. A., Craig Engines, Owned by Henry F. Lippitt, Providence, R. I

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HOW TO BUILD AN ICE-YACHT OF THE 400 SQUARE FOOT CLASS

H. Percy Ashley

IN the accompanying plans are shown a 400 square foot class ice-yacht with double cockpit that will accommodate four persons with comfort. This double cockpit has had an impartial trial and been found to be a success. The additional weight of passengers in the forward cockpit tends to keep the boat from rearing in the air under a stiff puff. The forward cockpit can be removed in a few moments.

Details of Construction

Materials.—For backbone white pine; center clear spruce; sides white oak caps; runner plank bass wood, butternut, or oak; cockpit oak; runners, chocks, etc., quartered white oak. All ironwork first grade Swedish iron. Runners soft cast iron.

Principal Measurements

Backbone.—37 feet over all, 12 inches at center, 5 inches stern, 3½ inches at nose; width 4¼ inches. Select only the very best grades of wood well seasoned and free from checks. (Refer to Plate 2, showing backbone.) The backbone is capped on the upper and lower side full length with strips of oak 4¼ inches wide and ⅝ inch thick. The lengthwise side strips of spruce (straight-grained) are 1¼ inches thick and 37 feet long. The filling-in pieces placed between the side pieces are of seasoned white pine leaving the hollow places as shown in Plate 2. The different pieces are put together with hot glue and brass screws. If the side pieces cannot be obtained 37 feet long, two pieces can be used on each side,

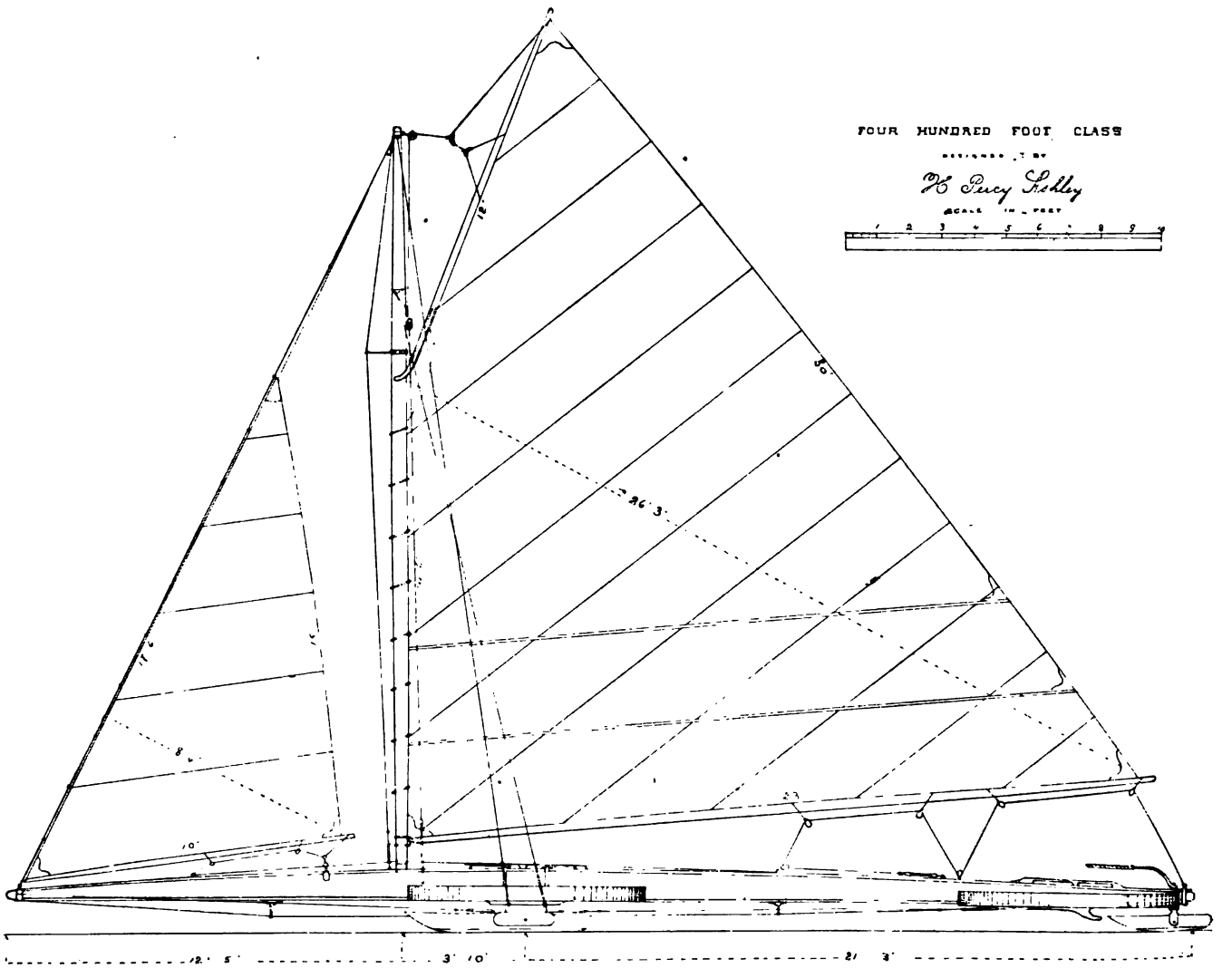

Plate No. 1. Sheer and Sail Plan of 400 Square Foot Class Ice-Yacht

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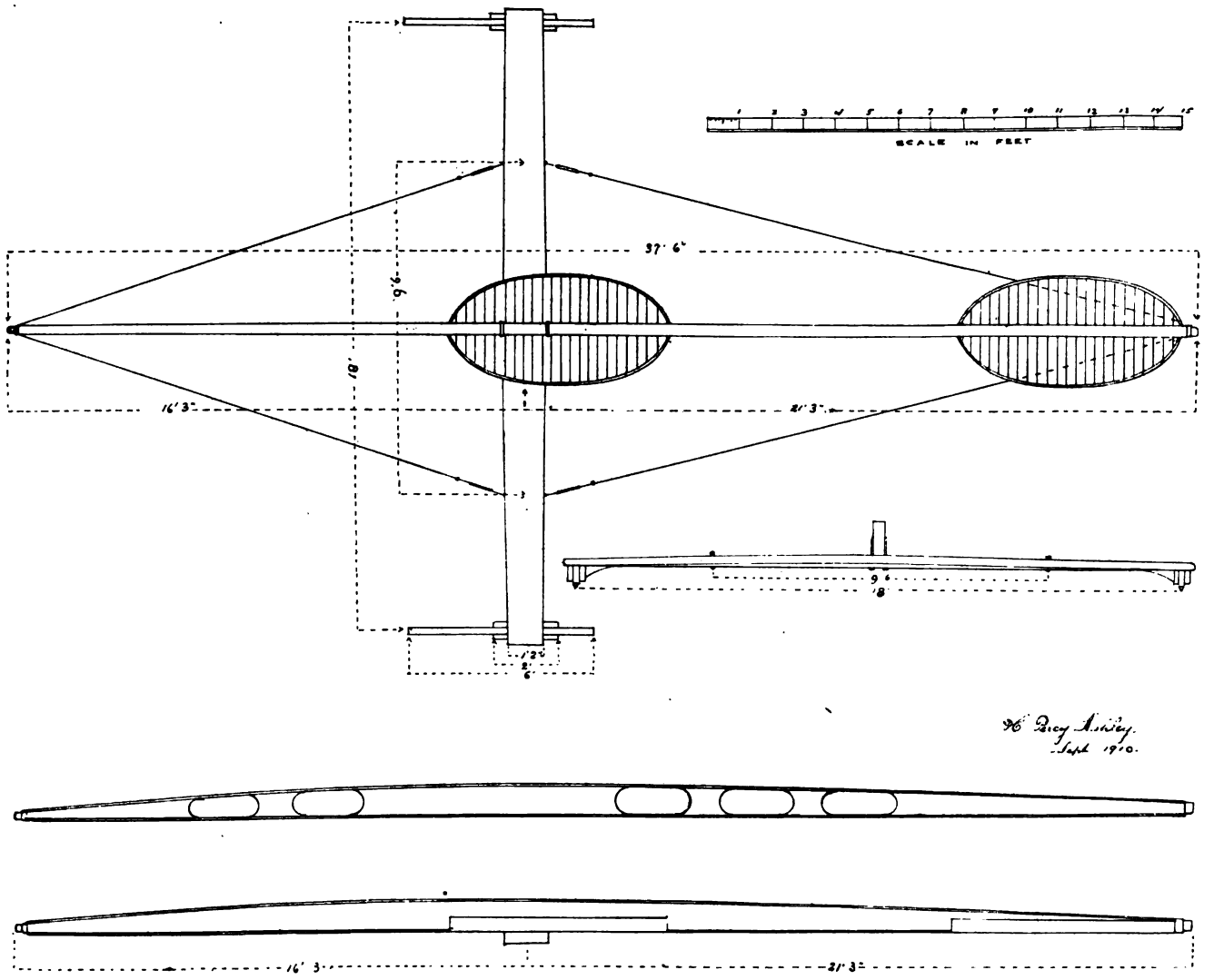

Plate No. 2. Deck and Sheer Plans

making the joint under one of the straps that hold the runner plank to the backbone. Plates 1 and 2 give dimensions and shape of backbone.

Runner Plank.—Should be of seasoned bass wood or butternut, with the heart on the upper side. This gives the natural upper curve from the ice which acts as a spring and lessens the strain on the boat over uneven ice. The plank is 18 feet 10 inches over all, 16 inches at center, 14 inches at ends; 4⅛ inches thick at center, 2¾ inches at ends. Straddle of shrouds 9 feet 6 inches; cut of runners 18 feet. Plane the ends down from upper side; take the rounding edge off from under side, working from nothing at ends and increasing gradually at center.

Runner Chocks or Guides.—Made of white quartered oak, are 24 inches over all, 1⅞ inches thick, 4½ inches deep, and are sunk in runner plank ¼ inch and fastened with glue and ½-inch lag-bolts. (See Plate 3, drafts D and E.)

Runners.—Details are found on Plate 3. The runners must be of the very best seasoned quartered oak, and you cannot use too much care in selecting your oak. They are shod with soft cast iron, which has proved the best material after many expensive experiments, and are filed and finished with emery paper, making the cutting edge to 45°. The fore-and-aft curve of the shoe has a downward curve of ⅛ inch. The runner shoes can be planed and the cutting fore-and-aft curve can be put in by clamping center down on the planing machine. The fore runners are 6 feet over all, 7¼ inches at center including iron and wood, and 2⅛ inches thick. The soft iron casting is 2¼ inches deep. A brass plate 2 inches by 7 inches by ¼ inch is inserted on each side (see draft G), and is pierced with three holes for the ¾-inch riding bolt that can be shifted according as desired for rough or smooth ice. The shoe is fastened by ⅝-inch machine bolts. (See drafts A and G.) The rudder is also of white quartered oak, being 3 feet 2¾ inches over all, 5 inches deep, including wood and iron. The cast-iron shoe is 1⅞ inches deep and is pierced by four machine bolts of ½ inch in diameter.

Cockpits.—There are two cockpits. The aft or steering one is stationary, while the fore or passenger cockpit can be removed at will. Both cockpits are of the same dimensions, being 7 feet over all, 42 inches wide, with a bent rail of 4 inches by 1½ inches, and has a groove made before bending of ½ inch by ⅞ inch. The flooring is ½-inch tongued-and-grooved oak 4 inches wide. The rail is also of oak. The forward cockpit is made in two halves and is hung on the backbone with

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wrought iron straps and bolts. (See Plate 4, Figs. 32, 35 and 37.) Two pieces of oak, ½ inch by 4 inches, are screwed to the flooring parallel with the backbone in forward cockpit. The runner plank which passes under this cockpit gives it stability.

Spars.—The spars should be hollow and are of the following dimensions: Mast 23 feet 3 inches, heel 3¾ inches, center 5¼ inches, tip 4 inches; boom 23 feet 6 inches, heel 3¾ inches, center 4 inches, tip 2⅞ inches at ends; gaff 12 feet 6 inches, center 3½ inches, ends 2½ inches; jib-boom 10 feet 6 inches, 1¾ inches at ends, 2⅛ inches at center. Gaff is furnished with bent jaws of oak and main-boom with gooseneck.

Standing Steel Rigging.—For the shrouds use 5-16 diameter galvanized cast-steel yacht rigging; jibstay ⅜-inch diameter; runner plank guys 5-16 diameter; bobstay ⅜-inch diameter; martingale stay ¼-inch diameter.

Running Steel Rigging.—Throat and peak halyards ⅜-inch diameter; jib halyards ¼-inch diameter.

Manila Rigging.—Main-sheet 9-16-inch Russian bolt rope; jigs 7-16-inch manila bolt rope, 4 strand; jib-sheet ⅜-inch manila bolt rope.

Turnbuckles.—Of Merriman design. (Plate 5, No. 25.) Four bronze turnbuckles ½-inch thread for shrouds, one turnbuckle ⅝-inch for jibstay; one turnbuckle for bobstay ⅝-inch; four turnbuckles ⅜-inch for runner plank stays; one turnbuckle for martingale stay ⅜-inch diameter thread.

Block and Cleats.—Use Merriman Brothers' wire rope blocks, as shown in Plate 4, No. 1. Two blocks for wire rope ⅜-inch for peak and throat, and one block for wire rope ¼-inch diameter for jib halyard. Durkee's cleats, four of 6-inch and one of 7-inch. The blocks in Plate 4, Fig. 2, are used for main and jib-sheets.

Steering Gear.—By referring to Plate 3, full detail of ironwork for steering will be seen (drafts B and C). Note the broadness in the jaws of the crutch which gives steadiness and strength of steering. The principal dimensions are as follows: Tiller 3 feet 5 inches; rudder-post 1¼ inches diameter; shoulder to lower end of jaws 4 inches; depth of jaws 2⅞ inches; length of post, including screw top, 12 inches. A rubber washer on rudder-posts is used to act as a spring over rough ice.

Varnish, etc.—Give hull one coat light colored filler, sandpaper. Two coats best spar varnish, sandpaper and pumice stone first coat. All ironwork two coats silver bronze. Buff bronze turnbuckles, blocks and cleats, and coat with Egyptian lacquer and will stay bright all Winter. After polishing boil in water with a little gold dust before applying lacquer.

Dimensions of Sails.—The figures call for the sails fully stretched. Mainsail: hoist 14 feet 6 inches; boom 23 feet; gaff 12 feet; leach 30 feet; diagonal 26 feet 3 inches, containing 323.12 square feet. Jib: on stay 17 feet 6 inches; luff 15 feet; foot 10 feet; diagonal 8 feet 6 inches; containing 74.37 square feet. Total sail area 397.49 square feet.

Ironwork.—(See Plate 4.) Nos. 4, 5, 6 and 7 show bands for nose of backbone; Nos. 10, 11, 12, 13 and 14 are the saddles that fit over backbone and hold runner plank in place. There are two of these. A chock should be sunk in runner plank at each side to connect with

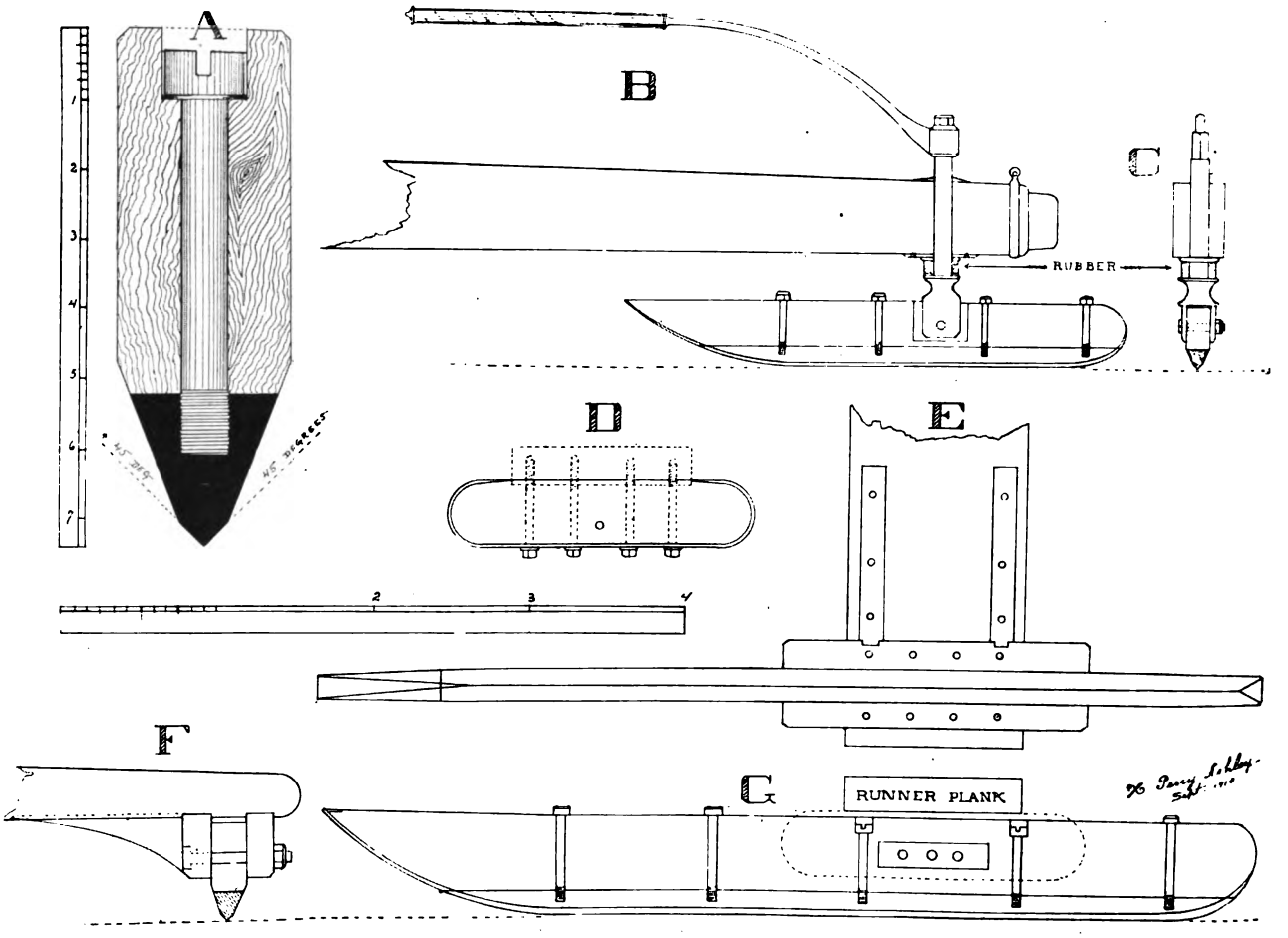

Plate No. 3. Detail of Runners and Steering Gear

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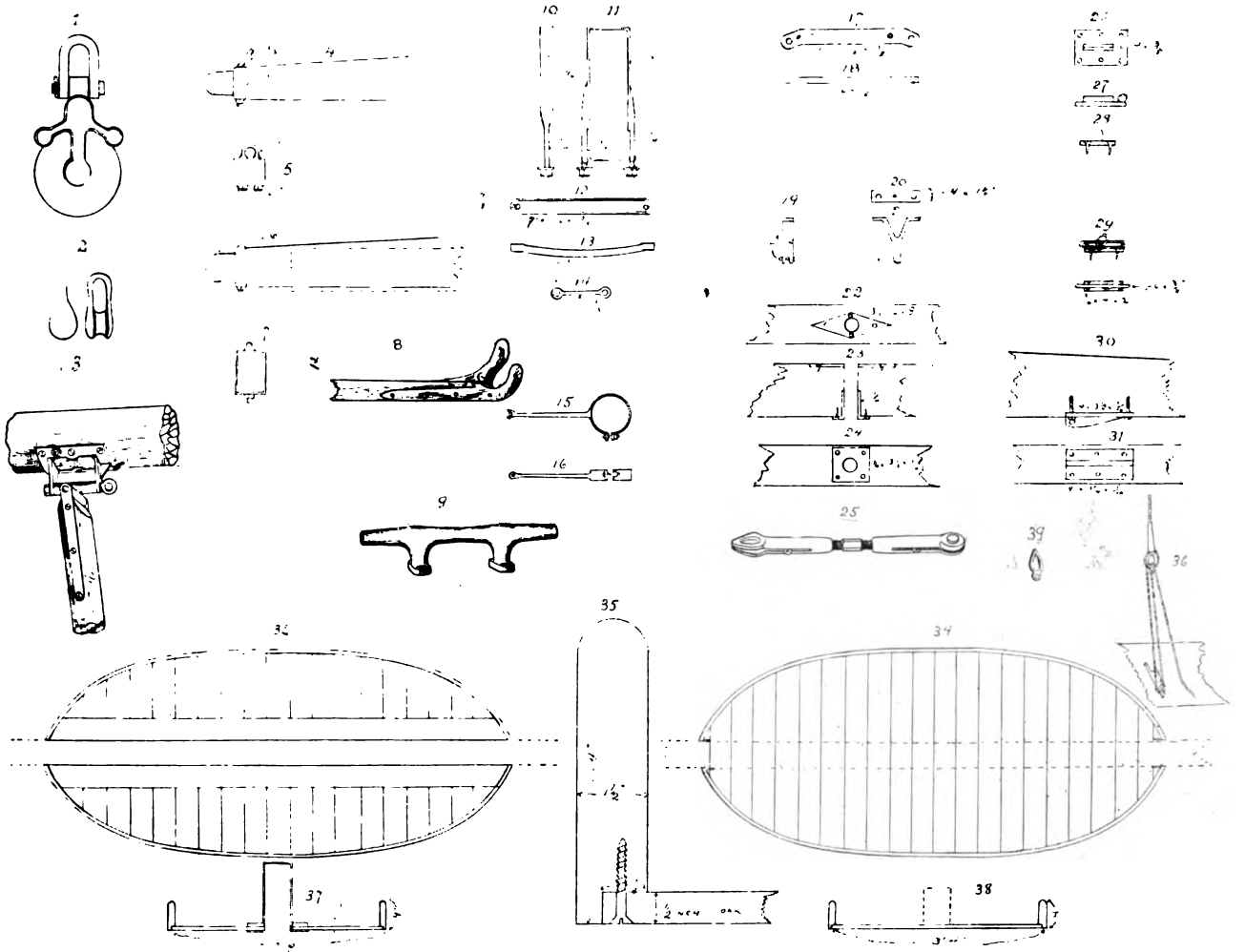
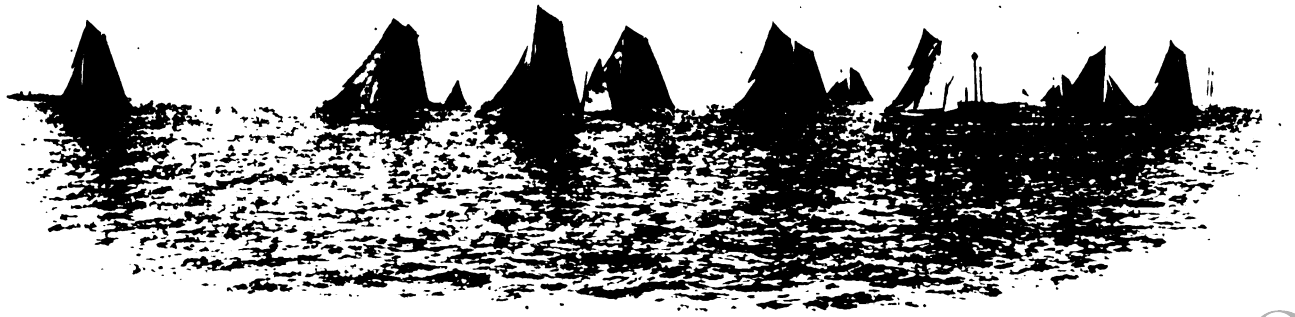


Plate No. 4. Ironwork and Detail of Cockpits

backbone to keep backbone from slipping sidewise as boat raises in the air. Nos. 15 and 16 are the martingale spreader. Nos. 17 and 18 straps through which ring bolts for shrouds pass on the ends to fasten the turnbuckles for runner plank guys. Nos. 19, 20 and 21 bobstay spreaders. No. 22 top plate for rudder-post; Nos. 23 and 24 lower plate for same. Nos. 26, 27 and 28 mast-step. No. 29 two drafts of jib traveler. Nos. 30 and 31 anchor plate for bobstay under cockpit.

Rigging Requirements.—At the nose and heel the runner plank guys end in a loop. The bobstay has a loop at the nose and ends in a turnbuckle that fastens to the anchor plate under the cockpit aft. The shrouds, jibstay and martingale have loops at masthead and are spliced bare over solid thimbles. The loops are finished in pigskin and served with soft cotton twine over the splice and varnished; the parceling is done with insulating tape. Serve tiller with soft cotton twine and ride over a second serving over the first. For the halyards hoisting use a Higginson jig, as shown in Plate 4, No. 36. No. 39 shows the style of thimble, and is made by splicing rope to thimble at running part of halyard and passing back and forth through cleat and thimble. This gives a quick and strong purchase and does away with cumbersome blocks of the old-fashioned jig. The jib-sheet leads aft to steering cockpit. The main-sheet ends in a jig of a single block and a single block with becket. Be sure that your sail covers are large enough—the sailmaker always makes them too tight. The cockpit covers must fit tight around the cockpit rail. Many boats have sail and cockpit covers in one piece.



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BUILDING ADJIDAUMO—RUDDER SWALLOW

E. P. McLaughlin

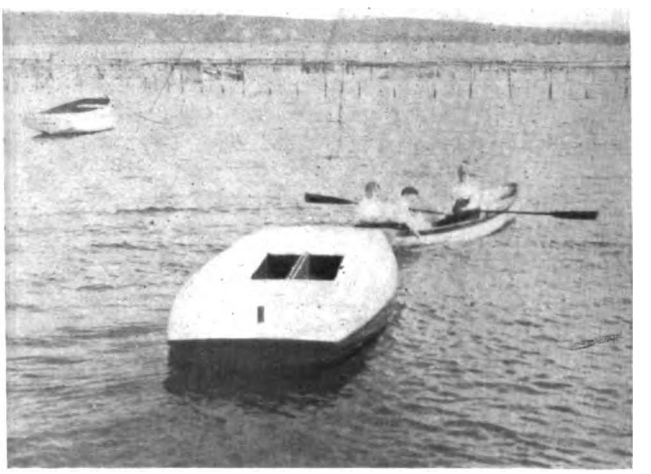
IN 1899, when THE RUDDER first published the lines of the racing scow Swallow, by C. D. Mower, we determined that some time we would hold the tiller over a boat from this design, as she was just the type we had been looking for, but we did not think that ten years would elapse before we had the pleasure of doing so.

The panic of 1907 and an attack of appendicitis (two things that are usually not conducive to yacht-building) at last presented the opportunity, and in the Spring of 1908 work began on the little racer. The backbone, sides, bow and stern transoms, frames, deck beams, etc., were laid out according to Mr. Mower's plans, and then, by the kindness of Mr. Fred Pendleton, the yacht-builder of Wiscasset, Me., who allowed us the use of his band-saw and planer, they were quickly sawn out and smoothed up ready to fasten together, thus saving a lot of time and hard work. We were delighted with the way everything went together, and she was soon in frame and ready for planking. Having reached this point in her construction we were obliged to leave her, and not until June, 1909, did we get a chance to continue the good work. At this time circumstances were such that we could get home every Saturday, and from this time to August the eight-hour-a-day schedule was pretty badly shattered; 4 a. m. to 9 p. m., with half an hour for meals, being the regular thing. During this period, while the boat was slowly growing by sheer hard work, she was a never-ending source of conversation and speculation to the numerous visitors who looked her over, and it was rather amusing to hear the comments of the old seadogs and lobstermen to whom she was a new type. The one point upon which they agreed, however, was: "She's the gosh dangdest looking boat I ever seed."

In putting together Adjidaumo, galvanized bolts and screws were used, with the exception of the deck, which was fastened with galvanized boat nails, but even here screws were used at the transoms and sides. For planking, ¾-inch pine was used instead of ½-inch pine, as called for in the plans, and the deck was ⅝-inch pine in place of ½-inch pine.

Extra knees were put in at the permanent moulds, also heavy deck beams around the mast, for additional strength, but otherwise the plans were followed exactly. On Monday, August 20, 1909, we put the little ship on rollers and shoved her out to the edge of the wharf, and at high tide over she dove head first into the Sheepscot River, christened with a big bunch of flowers. The only drinkables we had on hand was a bottle of beer, and as the day was rather sultry, we decided that beer was not just the thing for a Maine boat, so we put it to a little better use. There was still a lot of work to be done; the bowsprit to be fitted and fastened, cockpit coaming to be put in, cleats, etc., to be put on.

Luckily we had been able to get out all our spars and ironwork beforehand and, as the season was so advanced, we decided to put on an old suit of sails that we had, try her out with them and next season have our new ones. The mainsail was of the right dimensions on gaff and boom but was three feet shy on the hoist, and did not peak up anywhere near what it should, according to the sail plan, and was very heavy canvas, all out of shape, and the leach was so slack that when running closehauled it would shake the boat all over. The jib was just as bad, if not worse; the draft having worked into the leach, it held all the wind that went into it. In our light sails we were more fortunate; our balloon jib and spinnaker were beautifully fitting and very light weight. The spinnaker was pretty large for the boat, 23 feet hoist and about 20 feet on the boom, and we were obliged to top up the boom to keep the foot out of water. It is needless to say we only used it in the lightest breezes. But to return to our story. The day came when, although we were minus cleats and our rudder, which was unfortunately broken trying to get it into place, we decided to have a trial trip; using an oar to steer with and putting a pin through the centerboard box with nothing else to hold it, we started out the last of the afternoon. The wind had been blowing fresh from the Northwest all day, but a shower had killed it off, and when we left the float there was just a light air going; but no sooner were we out in the middle of the river when it breezed up again and the Northwest puffs came



Adjidaumo Overboard at Last

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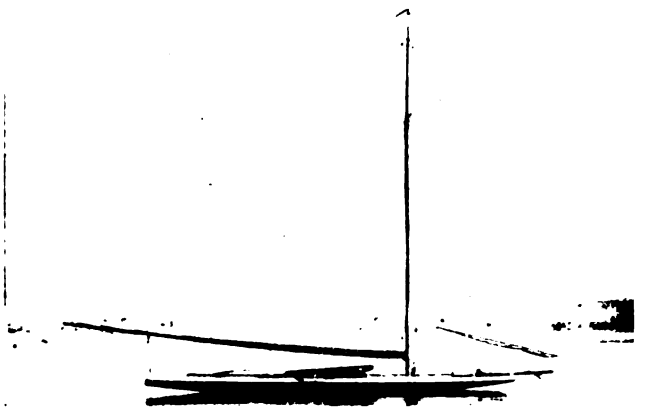


All Rigged and Ready for the First Sail

down over the highlands with considerable weight to them. The first puff we took all right. Adjidaumo dashed ahead as it struck her and as she put her lee rail under to it, out came the oar and she shot up on an even keel. As she did this, the centerboard washed aft to the stern end of the box, and the next puff striking us then, she paid off, no rudder to meet her, and flopped over on her side with her sails in the water. As she went one way, we went the other, and held her for a few moments as she was, sails flat on the water and the cockpit floating clear by about five inches; but as the sails soaked up, she gradually settled down and in a few seconds we were standing on her bottom, oar in hand and not even our white sneakers wet. We have had a number of capsizes in the course of our sailing career, but this one had as much class to it as any of them.

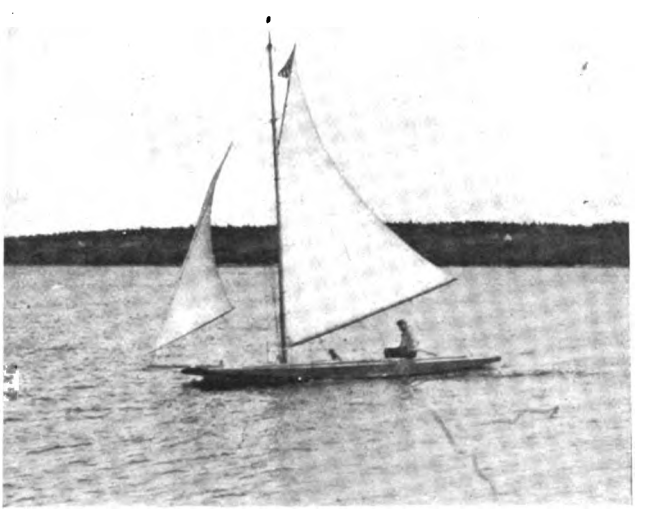
A friend in need appeared in a power boat and, putting a bridle on her, we soon had her on her side and then, assisted by two other friends, in a rowboat, we lowered the sails and putting one end of the bridle higher on the mast, up she came on an even keel, was soon bailed out and back at her moorings, without a particle of damage and only the loss of the centerboard pin. We decided after this experience we would always have a rudder and have the centerboard fastened in place, before we undertook to sail a racing scow again.

The following Saturday we got on our cleats (by the way, we have three jam cleats on each side, which are the finest things possible for a boat of this type) and our rudder fitted, and were out for an hour in a light breeze. We were delighted with the way she handled, but of course could get no line on her speed as we were sailing alone. The next day we put in the cockpit coaming and got it varnished, so didn't have a sail that day; and the following Friday, August 20, 1909, we were entered in the Fête Day races at Squirrel Island, Me.,—an annual event at that noted resort—with no chance in the meantime to try the boat or train the crew. Early Friday one of the crew arrived on the 3:20 a. m. train from Boston (coming down especially for the race), and we met him at the station and immediately started down river in our launch to where Adjidaumo was moored, leaving the fourth member of our crew to come down later by steamer. As usual, there were numerous last things to do,—a new rudder blade to be made and fitted to its post, spinnaker pole to be rigged, spinnaker and balloon jib halyards to be rove and spliced, a patch on the mainsail—and it was 11 a. m. before we started in tow of the launch for Squirrel Island. The finishing touches were put on as we towed down and a nice launch disposed of, put up by a thoughtful mother. We had none too much time, as it was 1 p. m. when we arrived at the island and the races were scheduled for 2:15 p. m., and we had a change of rudder to make. We changed rudders in about fifteen minutes and then hoisted our balloon jib to see if it fitted all right, but did not bother with the spinnaker, as we knew from the direction of the wind and the course given that we should not need it.

The course was from the starting line off Steamboat Landing at Squirrel Island around bell buoy off the Cuckolds, thence around red spar buoy "2½" off Ram Island, thence around black spar buoy No. 1 off Burnt Island, thence back to starting point, leaving all marks to port; a distance of about eight miles. We were entered in Class B boats: 21 L. W. L. or under, with handicaps for L. W. L. plus half the overhang.

The wind was about Southwest, blowing fresh and inclined to be puffy, and the tide was running out. The first leg was almost a dead beat to windward, and the wind against the tide kicked up a sea which couldn't have been worse for our type of boat but was simply pie for our two competitors, clean-cut, high-sided knockabouts, considerably longer water-line than we, and going through it as smooth as smelts, and, as far as we could see, not taking any water aboard, while we were simply buried. The water came over all sides at once; we would get a solid wave over the bow, which would wash aft, strike the coaming, dash into the air and shower the four of us, then a wave would strike directly under us, as we lay over to the breeze, and come spouting up the centerboard box like a geyser. Every other wave or so would pound up under the bow and she would quiver and stop dead, it seemed, and then gather way, only to repeat it all over again.

The other boats were leaving us fast, gaining at every leg, and it looked as though we were trimmed to a standstill; everything against us; the sea, our ill-fitting sails, and the fact that we did not know our type of boat and were only about half-sailing her. We saw the other boats round the Cuckolds bell buoy, one 12 minutes, the other 7 minutes ahead of us, hoist balloon jibs and tear off on the second leg, a broad reach, while we still pounded and wallowed for the mark. It seemed an hour before



Under Sail for the First Time

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we fetched around and our rivals so far to leeward we couldn't distinguish them apart.

As we rounded the buoy we lowered our working jib and ran up the ballooner, and our light sailsman, as he set it, was standing in about three inches of water; in fact, the old boat was all under to the mast and it looked as though our friends would have a chance to pick us up. But she popped up after a while and, as soon as everything was drawing well, we got as far aft as possible to hold her nose up. Even at that, she would scoop under to the mast every now and then when the waves got the right combination; but how she did go, scaling along, over, and through those waves with not a hesitation! At Ram Island buoy we were only about 300 feet behind the second boat and a reach for the third leg, but too close a reach to use our balloon jib. In taking in our balloon jib here we had a bad mix-up; for, by mistake, the throat halyards were cast off instead of the jib halyards and the throat partly lowered, so that after getting in the balloon jib we had to come up into the wind, hoist our throat and get on the working jib before rounding the buoy; we dropped three or four minutes right here.

We got out of this tangle after a while and from Ram Island buoy to Burnt Island buoy we had smooth water and a little more breeze, and Adjidaumo got up on her ear and skated right along, so that when we rounded Burnt Island buoy we were about 50 feet behind the second boat, with the first boat about halfway to the finish line. From Burnt Island buoy to the finish line off the wharf it was about a mile leg, another dead beat to windward, with quite a sea still on, and our rival commenced to leave us.

It had been looking pretty dark in the westward all the afternoon, and when we were about halfway up to the finish line, the squall swept down on us from the Southport shore, and the order was given, "All out to windward; we'll shove her now;" and we certainly did shove her, for with sheets well started and a smother of white water up to the cockpit on the lee side, every one as far out over the weather side as he could get, we boiled for the line. We could see the other boat down to leeward, luffing up to meet it; but no luffing for us. It was our chance and although we expected to see our mast go any minute, we held her to it. Our competitor was coming back fast, the finish line a few hundred feet ahead, and things coming our way when Mr. Trouble—this time in the shape of a big lighthouse tender—butted in again.

This lighthouse tender had been around watching the race and having run up to the line to see the finish, had stopped with her bow by the stakeboat; as we came sweeping up, we ran under her lee, lost our wind and finished 30 seconds behind the other boats, who were so far to the eastward that they were not affected.

When we reached our launch Adjidaumo was half full of water, we were all soaked to the skin and feeling rather blue, for we had forgotten about time allowance or any little thing like that; but, on going ashore, we were hailed as the winners. There were three boats in our class. Nirvana, E. Ward, owner, finished first, but was disqualified for having a professional skipper at the tiller during the race; the second boat, Dr. R. W. Kenyon, owner, on elapsed time, beat us 30 seconds, but, on corrected time, we trimmed him 4 minutes 43 seconds, and so, after all, won the cup, a beautiful copper and aluminum affair, suitably engraved.

DIXIE III WINS ON ST. LAWRENCE

AFTER the International Race, which, as chronicled before, was won by Dixie III, the English flyers, Pioneer and Zigorella, were given an opportunity to retrieve themselves in a series of races held on the St. Lawrence at Alexandria Bay under the joint auspices of the Thousand Islands Y. C. and the Royal St. Lawrence Y. C., the starters being Pioneer, Zigorella, Dixie III, and Squaw. Shortly after the start of the first race it was seen that Dixie was hopelessly outclassed so far as speed was concerned, and Pioneer dashed around the first lap a minute ahead of Dixie; on the second lap Pioneer damaged her propeller and withdrew. As Zigorella also dropped out and Squaw caught fire and was pretty badly burned, Dixie finished the course alone. Pioneer did not get going again and Dixie won the series, proving herself again a most reliable craft, her Crane & Whitman engine possessing the faculty of running most consistently.

Dixie III at Full Speed. Steered by Her Owner, F. K. Burnham, New York City

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INTER-CITY RACE BETWEEN 31-RATERS

DURING the annual race week of the Atlantic Y. C., which by the way was one of the most successful regattas ever held by the organization, a three-days' series of races was held between three Class P boats representing New York and three representing Boston. This contest was one of the features of the meet and was billed as the Inter-City Race. The race was on the point system, each contestant getting one point for entry and one for every boat defeated, thus the winner of any race receiving six points, the second boat five points, the third boat four points, etc. Although the New York boats won two out of the three races they were badly beaten on points, one of the home boats being last every day.

The boats picked to represent Boston were Amoret, Mavourneen and Timandra; Amoret having won the class championship of the Corinthian Y. C. of Marblehead for 31-raters this year, and Mavourneen that of the Boston Y. C. and the Yacht Racing Association of Massachusetts Bay. Both these boats were new this year and were designed by George Owen. Timandra is also an Owen boat which raced last year. A recapitulation of all the races given this season for the class in Massachusetts Bay shows the percentage of wins of the three boats to be in the order above given.

Of the New York boats, Cara Mia, ex-Naulahka, was turned out by Herreshoff last year and was the winner of the Manhasset Cup races of this season. Windward is a last year's Gardner boat and Crescent is a Gielow boat turned out in 1906.

The first race was sailed in a good wholesail breeze, and Cara Mia took the lead at the start and was never headed, winning easily, with Amoret of the Boston team second, Windward of the New York team third, Mavourneen and Timandra of the Boston team fourth and fifth, and Crescent last, making the score for the first day 11 to 10 in favor of New York.

On the second day the wind was light with a slight bobble which seemed to suit Timandra and Amoret better than the balance of the fleet, and they finished first and second, with Cara Mia third, Mavourneen fourth, and Windward and Crescent fifth and sixth, the score

Windward, Winner of the Last Race of the Series

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then standing 24 to 18 in favor of Boston, with Cara Mia of New York and Amoret of Boston tied on individual points.

On the last day the wind was light and Windward won rather easily, with Timandra second, Amoret third, Mavourneen fourth, Cara Mia fifth, and Crescent last, Boston thus winning the series by a score of 36 to 27 on points, with Amoret winner of the individual prize.

Although the contest was supposed to be a team race, the team work was never in evidence to any pronounced degree; still when opportunity offered the Boston boats covered their opponents neatly when on the wind.

Under the prevailing conditions on the last two days the light winds and strong tide made the racing uncertain, and frequently an excellent position would be lost through running into an area of strong current, but on the whole all hands suffered about equally, since, with one exception, all the boats were from waters other than those in which the contest was sailed.

The best of feeling prevailed throughout the series and the one protest which was made was later withdrawn after an explanation. On one occasion the three Boston boats were so close together on one of the outer marks that the strong tide cutting by the buoy brought them all together, but no damage was done and nobody's feelings were hurt.

This team racing adds much to the interest, and it is to be hoped that many more contests will be held, as all races of a similar nature held this season were successes.

LAYING UP THE ENGINE

Herbert L. Towle

ONE way to lay up the engine is to cover it with a piece of tarpaulin and forget it. That plan works excellently with an engine so new that nothing needs to be done to it and so protected that it cannot rust from neglect. It serves satisfactorily, also, with an engine so old and worn-out that trouble would be wasted on it.

The average engine falls somewhere between these two classes, and it is worth while, if not absolutely necessary, to spend some time at the end of the season putting it in shape to stand idle during the Winter months. Again, the process of lay-up and overhauling are quite closely related, and it is frequently desirable to perform both at the same time. This applies especially when only a moderate amount of work is required, such as the owner, with perhaps the assistance of a friend, can perform himself.

For the purpose of this article we will assume that shop-work is not required, and that the weather is such as to permit the minor overhauling to be done in preparation for Spring, before the boat is finally tucked under its sheet to hibernate. To be specific, it is well to say at once that such jobs as refitting, or even replacing, the main bearings, crank-pin or wrist-pin bushings, and piston rings, is beyond the scope of the novice or even the well-trained amateur. To begin with, it requires tools and appliances which the amateur seldom has. It requires, also, manual experience in handling tools, coupled with a due appreciation of the importance of a thousandth of an inch in fitting, which is wholly outside the mental processes of the average man outside of the shop. We will therefore assume that, if the engine betrays by sundry knocks and pounds the fact that its principal bearings are loose, the owner will take it to a well-equipped yard where shop facilities are available.

The overhauling which the average owner can properly do concerns such matters as leaky or badly adjusted valves, leaky gaskets, slightly loosened crank-pin bearings which can be taken up without scraping, and also such items as keeping the electrical equipment in shape, overhauling the circulating pump and oiling system, and the like. All of these are simple enough after one has become accustomed to them. To the experienced owner, they represent simply the extra expenditure of a certain number of hours. The novice, however, may find assistance in the notes which follow.

The first step in the mechanical overhauling is to make sure that there are no leaky gaskets about the cylinder-head igniter plates or crank-case, the last-named particularly if the engine is of the two-stroke type. Unless the gaskets are tight the compression cannot be tested; and to put a boat in commission in the Spring with a leaky crank-case or cylinder is not the best way to begin the new season. Crank-case gaskets are usually made of heavy paper, which may be cut to the outline of the joint by pressing it on the face of the cover plate or other part and following the impressed outline with shears. It is best to clean the joints carefully with gasolene and to put the gasket in place with shellac. This is a slightly troublesome job, owing to the fact that the paper swells when shellac is applied. The best plan is to fill a brush with shellac and paint it liberally on both the metal surfaces of the joints, after which the paper is laid on one surface (preferably the one from which studs project), and the joint completed before the shellac dries. If the shellac is painted on the paper the latter will swell so that it will not fit the joint.

To hold compression in the crank-case, the bushings on the crank-shaft must be a reasonably good fit. Slight leakages may be prevented by using grease as a lubricant, and this is the general practice. Mineral grease, which may be purchased under various names, is preferable to grease containing animal fat, as the latter requires heat to render it fluid and turns rancid in time. In some engines, special floating washers are provided on the crank-shaft next to the cranks, to prevent leakages.

Cylinder-head gaskets may be made of sheet asbestos, rubbed on one or both sides with flake graphite. This gasket, however, is successful only if the surfaces are accurately matched and the holding studs are fairly close together. A better gasket, and one which holds where the simple sheet asbestos gaskets would blow out, is made from asbestos reinforced with woven brass or copper

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wire, and made impervious with rubber. This form of asbestos sheet which is regularly sold for packing gas engine cylinder-heads, is graphited on one side by the makers.

Before closing up the crank-case, it is well to see if the crank-pin bearings are snug. Get a friend to rock the fly-wheel slightly to and fro, with the crank set at about mid-stroke. With an electric light shaded so that it will not shine in your eyes, watch carefully for the slightest movement of the crank-pin inside the large end of the connecting-rod. A very slight movement of the fly-wheel suffices to disclose crank-pin looseness, if it exists.

If the crank-pin is loose, take off the bottom cap of the connecting-rod, push the rod up, and prop it so it will not fall down. Wipe the crank-pin clean and examine both the crank-pin and bushing for scoring due to lack of oil. If the surfaces are bright and smooth, apply a pair of calipers to the crank-pins, over two diameters at right angles, to determine whether or not it is worn out of round. To use old-fashioned springy calipers correctly is an art in itself. One should barely be able to feel the ends touch the crank-pin as they go over it. With the modern stiff calipers the trick is less difficult. A crank-pin tends to wear flat at what may be called its top point, i. e., the surface on which pressure comes when the crank is on dead center, owing to the pressure being a maximum on that point. When the flatness amounts to more than three to four thousandths of an inch, or the thickness of an ordinary sheet of paper, it is impossible to get a proper fit; but the pin must be made round again by filing or lapping and the bushing refitted or replaced. This is a shop job. If the pin is slightly loose but not materially worn out of round, and the bushing is smooth, the looseness may be taken up by filing a little off the shims or the faces of the bottom caps. This must be carefully done, as the tendency of the novice is to file a surface convex instead of flat. When the work is properly done no shake should be perceptible, yet there should not be the slightest tightness at any position of the fly-wheel. Of course the crank-pin must be oiled before the cap is finally tightened up, and the lock-nuts holding the cap should be secured by cotter-pins.

If any of the cylinders fail to hold compression well, the cause will probably be found in leaky exhaust valves. Put a little oil on top of the piston, through the relief cock or spark-plug hole, and if the compression is considerably improved it will prove that the piston rings are at fault. The owner, if he knows how, can replace piston rings, but he is more likely to get them wrong than right. If the rings are loose, there is likely to be enough other work necessary about the engine to make it worth while to send it to the shop.

If the cylinder still leaks after the piston rings have been made tight with oil, and the gaskets under cylinder-head, ignition plates, etc., have been proven guiltless, the only thing left to suspect is the exhaust valves. This refers of course to four-stroke engines. To remove an exhaust valve, raise up the lower end of the spring and slip out the key which holds it. Remove the valve and spring, and grind the valve with a paste of fine emery and oil. The job should be finished with the finest flour of emery, or, better, with the grinding paste sold for this purpose. Rotate the valve back and forth by quarter turns with the screw-driver, lifting it and giving it an extra quarter turn frequently, so as to grind it true and round. Use plenty of emery, but be careful not to let any of the paste get into the cylinder. The finished surface should have a smooth dull appearance, not glossy. Then it should be wiped clean with kerosene or gasolene. To replace the spring, if too stiff to be readily compressed with the fingers, compress it in a vise, and tie it with three wires.

If make-and-break ignition is used, it is well to throw away the contact makers, if they have begun to be troublesome, and insert new ones. Frequently the fingers have simple steel contacts, which of course burn away very quickly and give constant trouble. By drilling both the stationary and moving contacts, thick platinum wire points can be inserted, and these will last a long time. The best material is an alloy of platinum and iridium. Before replacing the igniters, see that the inside insulating surfaces are free of carbon deposits which might tend to ground the current. It is a good idea, also, to insure positive grounding of the rocker contacts by connecting short lengths of flexible wire to them and to some stationary part of the igniter plates, such as a nut or one of the holding studs. Frequently these rocker contacts give trouble, owing to loose contact, or to oil working past them. Before leaving the igniters, it is well to turn the engine over and mark the fly-wheel at the precise point where the contact snaps, thereby making sure that all the cylinders ignite with the cranks in the same position.

If jump-spark ignition is used in connection with a roller or snap contact timer, a season, or two seasons, is likely to put the timer on the retired list. If the contact surfaces are rough or burned, or if the insulator of a roller type timer is rough between the contact segments, or if the timer itself is of the plain bearing type and is worn loose so that it wobbles on its shaft, accurate timing cannot be expected, and with timers as low in price as they are to-day, it is economy to throw away the defective member and provide a new or better one. The writer prefers a ball-bearing snap contact timer, if a timer must be used at all. Personally, however, I prefer a system combining a contact maker and high-tension distributor in a single piece of apparatus and producing a single spark for each ignition instead of the series of sparks produced by the ordinary trembler coil. If the latter sort of coil is used it is well to examine the contact points of the screw and trembler blade to see how much longer they will last. If they seem to be approaching their finish it is well to order a new screw and blade from the makers.

If the wiring is frayed or loose and straggling, it should be overhauled and a shipshaped job made of it. There is nothing more inexcusable than "sloppy" wiring about a boat; nothing is more easily made right and nothing is more apt to give trouble if it is not right. The primary wire should be properly protected and supported, with sufficient slack for bending without breaking where it connects to the timer or the igniter plates, and the secondary cables from coil or distributor to spark plugs should be without a splice. It is well, also, to put rubber hoods over the spark plugs, but this can be left until the Spring. The coil, and in fact all the electrical appliances, should be protected from water.

If a storage battery is used, it is best to remove it from the boat, charge it fully and store it in a cool place, giving it a slight freshening charge every month or six weeks until Spring After charging the battery, look inside to see that the solution covers the plates, and test it with a hydrometer. It should test about 1250. If a caustic potash or sal-ammoniac battery is used, no special

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laying-up precautions are required. Dry batteries, if used, are dead anyway by Spring.

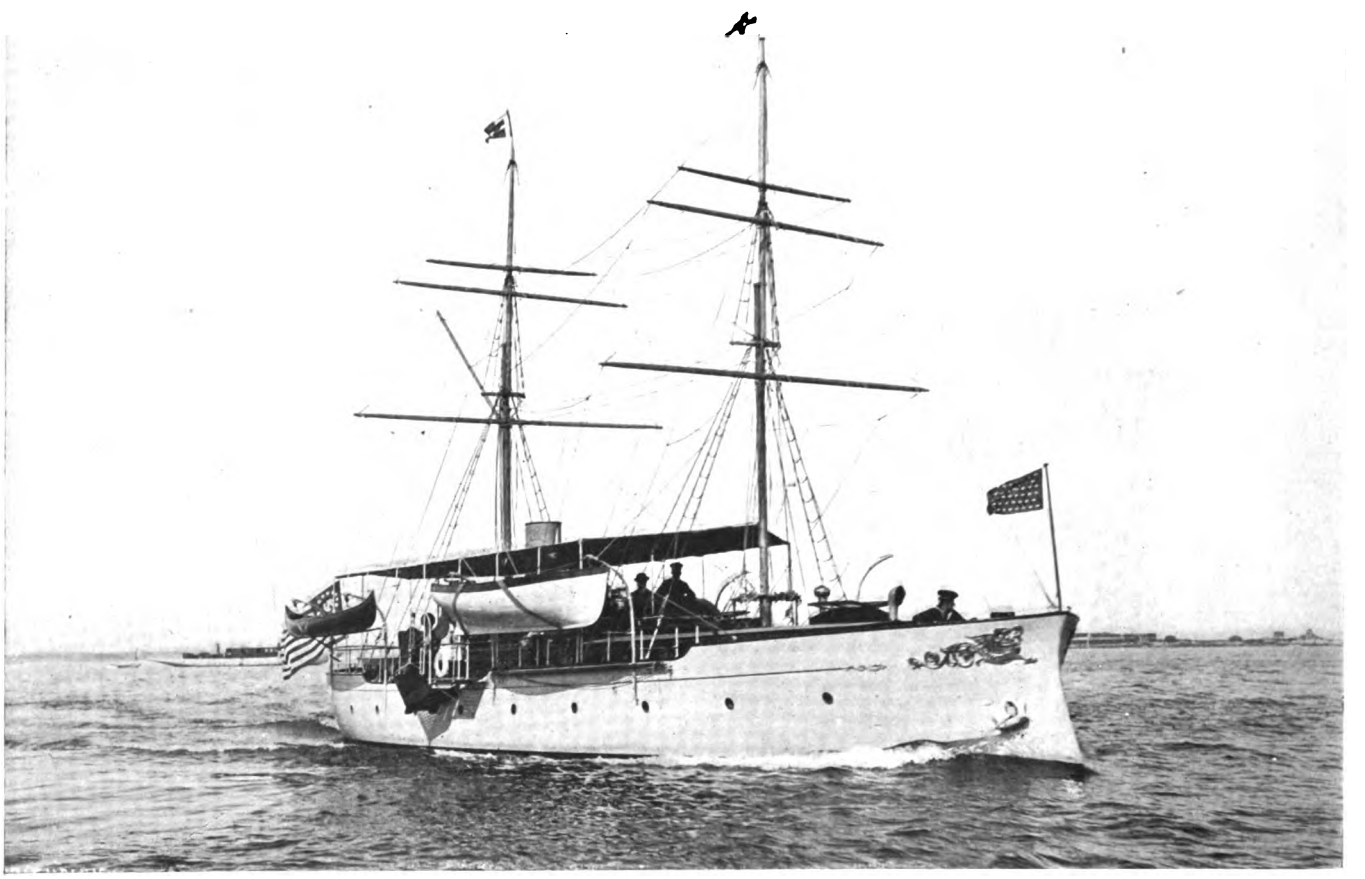
If a mechanical oiler is used, see that there are no leaks in the oil piping. If leaks exist, have them corrected by sweating or otherwise, according to the nature of the joint. If the oiler is of the check-valve type, it is well to be sure that each individual pump is feeding. Opening the miniature check valves for cleaning is a delicate operation, as the steel balls used as checks are very small and easily lost. Nevertheless, the job may have to be done.

If the grease cups on the main bearings of a two-stroke engine contain animal grease, it is liable to get either hard or rancid before Spring, and it is best to work it out by emptying the grease cups and filling them with a thin slush of mineral grease and kerosene oil. This is worked into the bearings as fast as possible during the last few minutes of the engine's run, and afterward the grease cups should be filled with mineral grease and the same worked into the bearings. After shutting down the engine the last time it is run, pour a few spoonfuls of oil into each cylinder and crank the engine to work the oil down around the piston rings, thereby loosening them from possible accumulation of carbon. If the oil in the crank-case is black and dirty, draw it off, flushing the engine with a little kerosene. One way to do this is to pour a little kerosene into the crank-case, just before shutting down the engine, and let it splash about.

Occasionally the engine and propeller shaft will get a trifle out of line due to "weaving" of the hull. Unless the flexible coupling will take care of this, it is well to slacken the holding-down bolts of the engine and make a new alignment with shims or liners under the engine feet, or if necessary, by cutting into the foundation to lower the engine.

To prevent cracked water-jackets and piping, drain off the entire circulating system. Open all pet-cocks, take the ckeck valves out of the pump, also from the suction intake if there is a check there, and be sure that there are no pockets where water can lie trapped. Replace the ckeck valves to avoid losing them. If there is a rubber hose in the water system, replace it also unless you know it is sound.

The last step in laying up the engine is to polish the bright iron and steel work, and wipe them freely with cylinder oil to prevent rusting; also to polish the brass work and wrap it in paper to exclude air as much as possible. This done, the engine will keep over Winter and be as good in the Spring as it was in the Fall.



Friendship IX, 60 Ft. O. A. 60-H.P Sterling Engine. Owned by Harry L. Friend, Marblehead, Mass.

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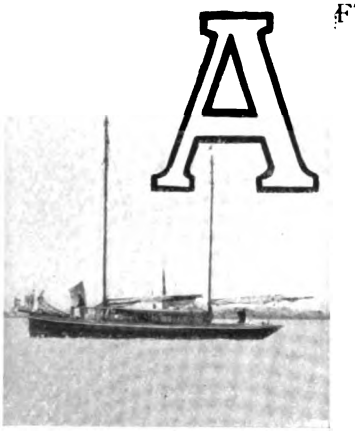
RACE FOR RUDDER CUP, SHANGHAI Y. C.



AFTER the splendid breeze that had prevailed on the Saturday afternoon preceding the day of THE RUDDER Cup Race, out at the mouth of the river, sending as it did the yachts which went cruising bowling along at a rare pace with gunwale down to the water's edge, Sunday morning dawned inauspiciously. As the yachtsmen who had slept at Woosung overnight slipped up from their cabins or crept from under awnings—for the night had been almost too hot to sleep below—their hopes were laid low by finding not a breath of wind upon the river. The water was without a ripple, and a thin haze overhung the land. For a race arranged with special regard to testing the ocean-going qualities of the yachts this was a wholly unfavorable morning, for although those on the smaller and lighter boats would be able to sneak along in the calm water which was sure to be the rule, the heavy yachts designed for work in a stiff breeze and heavy sea would be quite out of it. Mr. Day, editor of THE RUDDER, who had presented THE RUDDER Cup which was the trophy for the day's race, is particularly interested in ocean yachting, and very naturally desires to further it here as elsewhere. Hence the course selected was such that in a good breeze the conditions would be excellent for the larger boats. The course was laid down as follows:

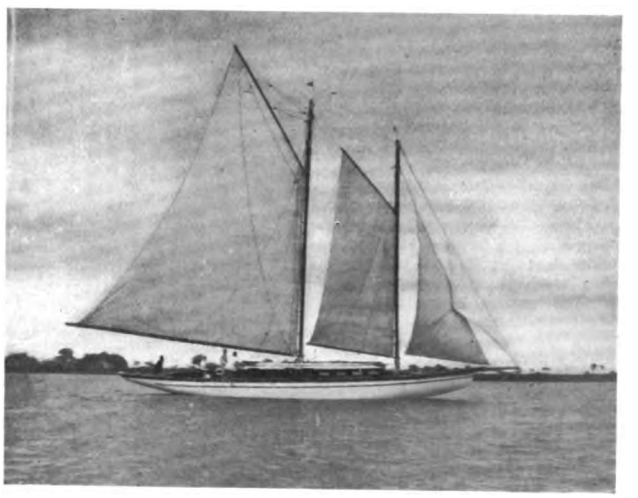
Start.—Prince's Pier starting line, Woosung, 9:30 a. m.; second gun. *Course.*—Leave Fort buoy to starboard and pass out between the Lismore and Spit buoys. Sail down the Yangtsze round the Blockhouse buoy to port, then up river round the Upper Quarantine buoy to port, leaving Lower Quarantine buoy to starboard (that is passing on the deep channel side of it), then round the Lismore to port, down again round the Blockhouse buoy to port, up again round the Upper Quarantine buoy leaving Lower Quarantine buoy to starboard as before, then in between Lismore and Spit buoys to Prince's Pier, leaving Fort buoy to port. Distance 29 miles.

It was arranged that the competition for THE RUDDER Cup should be decided upon rating, while over the same course the Vice-Commodore's Cup was competed for sailing handicaps.

As the time of starting approached the wind rose slightly, but was light and variable from a Northerly direction. At the same time the tide was flooding, and accordingly the yachts which had anchored up-stream overnight had to be underway early to reach the starting point in time. It was no easy matter jockeying for position after the first gun went, the tide and wind proving so unfavorable, and when the second gun was fired a minute or two elapsed before the first got over. This was Atlantic, and close upon her came Haikuan with Gull third. The others to start were Moeve, Viola, Teutonia, Winsome, Spoondrift, Violet, Marjorie L., Aeolian, and Phyllis, and out of these Marjorie L. secured the weather berth. In the light wind Spoondrift at once showed her paces, and secured a very good lead which as the minutes passed on she increased. To start with the race was nothing more than a series of short tacks, which of course favored the smaller yachts, and with Spoondrift well in the lead and Gull and Haikuan following they held over towards the Pootung shore, where in the shallower water they would escape the force of the tide. While they were away upon the port tack, boats such as Phyllis, Marjorie L. and Aeolian kept away upon the starboard run, and though by doing so they had to encounter more tide, the wind was if anything fresher here. So light was the wind, however, that the yachts scarcely heeled over to it at all, and going was very slow. Still maintaining her position Spoondrift was first past the Lismore buoy and a few minutes later Gull rounded. The schooner Viola was third, and Haikuan fourth. Coming over from the Pootung side these lighter craft simply skimmed round the mark, but the heavier boats, having stood well up to the Conservancy works, had to make a big tack to round her.

All the morning the wind continued light, and at times the race threatened to develop into a drifting match. Under these conditions Spoondrift walked off from the rest, but now Gull, getting evidently too far inshore, lost ground. After a time the wind became closehauled, and making for the Blockhouse buoy Marjorie L., which had been in the rear of the fleet until this time, crept up on Teutonia, Winsome, and Haikuan, owing to her ability to point higher. Soon, however, the wind again slackened, favoring the foremost boats still further. Under these conditions Winsome also sailed well and soon she came close up to the leaders.

The Blockhouse buoy was rounded by Spoondrift



Viola

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Teutonia

Marjorie L.

about twelve o'clock two and a half hours from the start. Time was required to accomplish something like six miles, a fact which is the best illustration of the state of the weather. It is of interest to note that cruising over the same course the previous afternoon Marjorie L. accomplished the same distance in about half an hour, yet on the present occasion she was over a mile behind the leaders. Round the buoy Violet was second, Phyllis third, and Gull fourth, while the others now came gradually up.

About this time the breeze showed a tendency to veer to the Southeast, and freshening as the afternoon wore on the race improved vastly in character. Starting the second time round Gull overtook Spoondrift and assumed the lead, with Phyllis third and Violet fourth, and now the yachts began to travel through the water. Under the changed conditions Marjorie L. improved her position greatly, and showed her real qualities. She went through the water in the best of style, and soon had passed Atlantic, Teutonia, Viola and Haikuan, and these now gave up. The position of the leaders had now altered and Winsome and Gull were sailing together, and turning on the homeward run together made a fine race of it. Spoondrift gradually dropped back, and Phyllis took third place, while Violet now threatened Spoondrift's position. About half-past four o'clock Viola gave up, and Moeve, having already turned away from the course in the direction of Shanghai, only seven boats were left in the race. Foam, it should be mentioned, left her moorings so late in the morning that she was long after the others in reaching the starting line, and did not go through the race seriously. Aeolian was so far behind that her time was not taken.

Gull was first across the line but so well had Winsome come up that the latter was only 17 seconds behind. Phyllis was third 13 minutes later, Violet fourth 11 minutes after her and just a minute before Spoondrift, while Marjorie L. was 13 minutes behind her. Winsome won THE RUDDER Cup upon her rating, and under the handicaps the Vice-Commodore's Cup went to Phyllis. Winsome is deserving of every credit. She is a boat built for racing in the river only, and her victory proves her to have been remarkably well sailed.

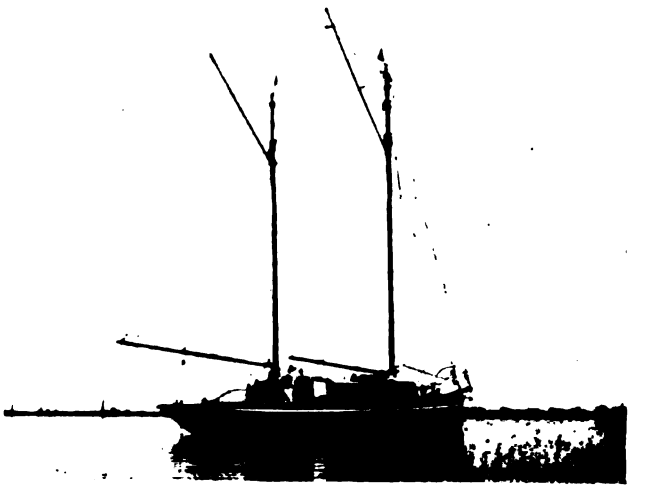
Unfortunately a good photo of Winsome was not obtained.

Herewith are given the times:

Boat	Finishing Time H. M. S.	Elapsed Time H. M. S.	Time Allow. M. S.	Rating Time H. M. S.	H'ps. M. S.	Corrected Time H. M. S.
Gull	4:46:00	7:16:00	19:37	6:56:23	Scr.	7:16:00
Marjorie L.	5:24:18	7:54:18	6:42	7:47:36	3:30	7:50:48
Violet	5:10:07	7:40:07	25:28	7:14:39	12:00	7:28:07
Spoondrift	5:11:24	7:41:24	23:36	7:17:48	10:00	7:31:24
Winsome	4:46:17	7:16:17	27:00	6:49:17	1:30	7:14:47
Phyllis	4:59:07	7:27:09	23:36	7:03:33	25:00	7:02:09

Rudder Cup won by Winsome.

Aeolian a Four Winds Model



Foam

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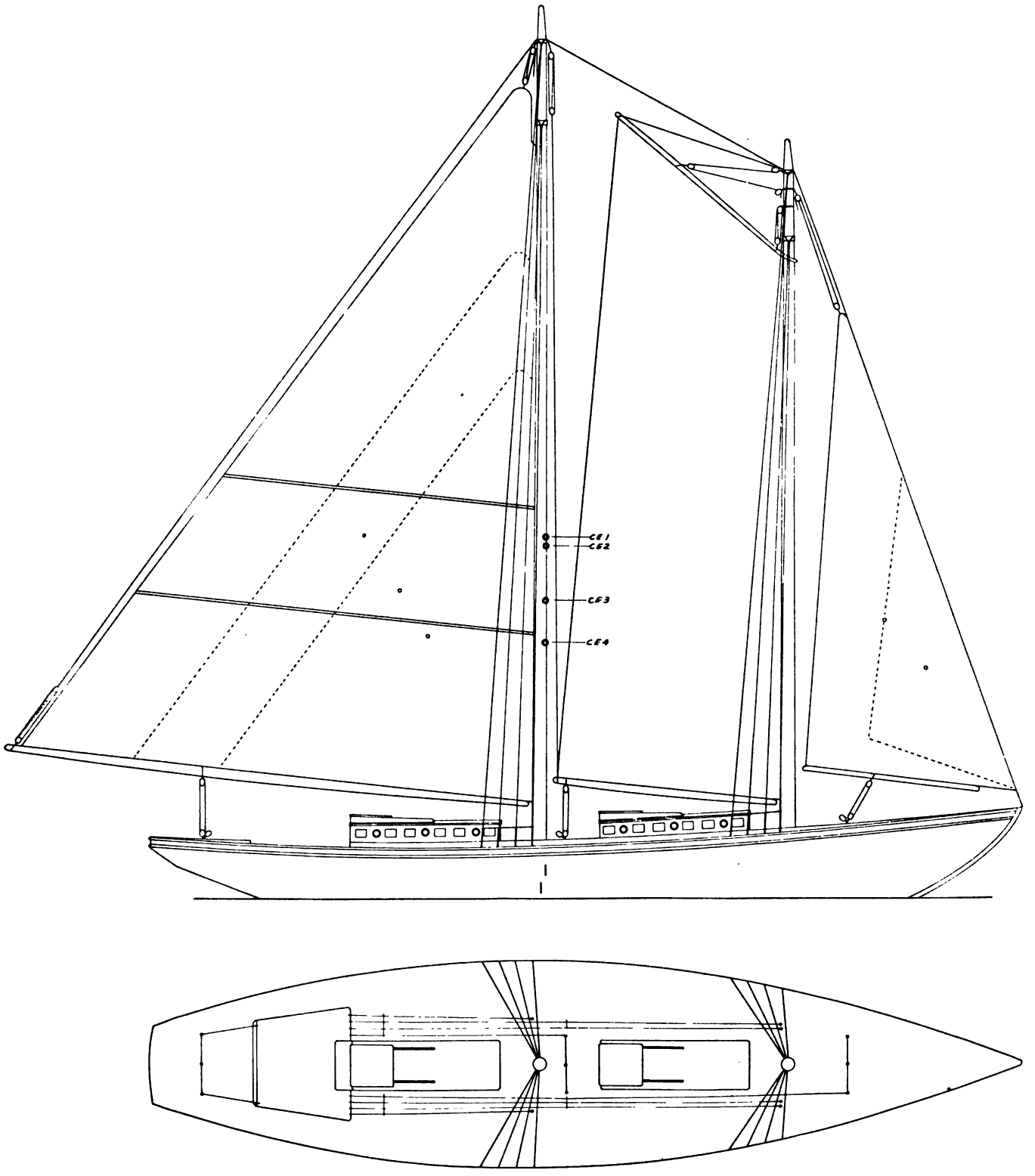

Fifty-Five-Foot Cruising Schooner. Designed by Sydney I. Prescott, New York City

FIFTY-FIVE-FOOT CRUISING SCHOONER

THE schooner shown in the accompanying drawings was designed by Sydney I. Prescott, of New York City, for deep-sea and inter-island cruising in the East Indies and Far East. She is flush decked with a roomy cockpit, large enough to enable a small crew to handle her in ordinary weather from the cockpit. Light and ventilation is obtained through two long and narrow skylights fitted with deadlights and also six open ports each. The deck beams cross under the skylights for strength, except at companionway. The companionway leads to the engine room where twin auxiliary kerosene engines are installed one on either side of the companion passage. There are two fixed berths in the engine room, with lockers under-

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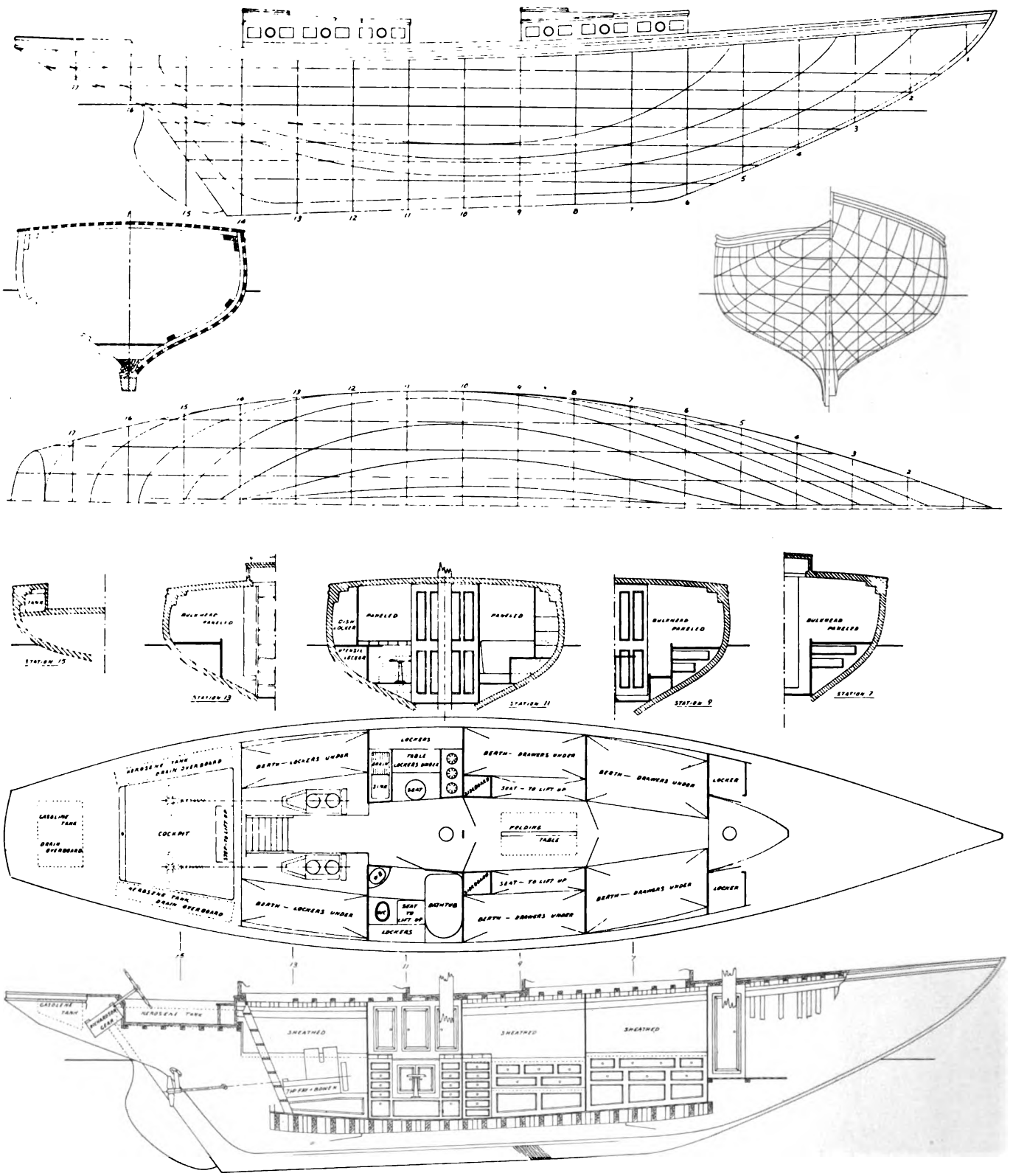

Lines and Accommodation Plans of Fifty-Five-Foot Auxiliary Schooner

neath each. Kerosene tanks are fitted under the main deck alongside the cockpit, and a gasolene tank under the deck abaft the cockpit, all draining overboard. Forward of the engine room, on the port side, is the galley fitted with an alcohol stove and the usual lockers for dishes and cooking utensils. Opposite the galley, on the starboard side, is a fully equipped bathroom. Forward of the mainmast is a cabin 7 feet long fitted with a folding table and two sideboards, two seats with lockers underneath and two berths with drawers under. Forward of this cabin is another fitted with two wide berths, each having drawers fitted underneath. These two cabins can

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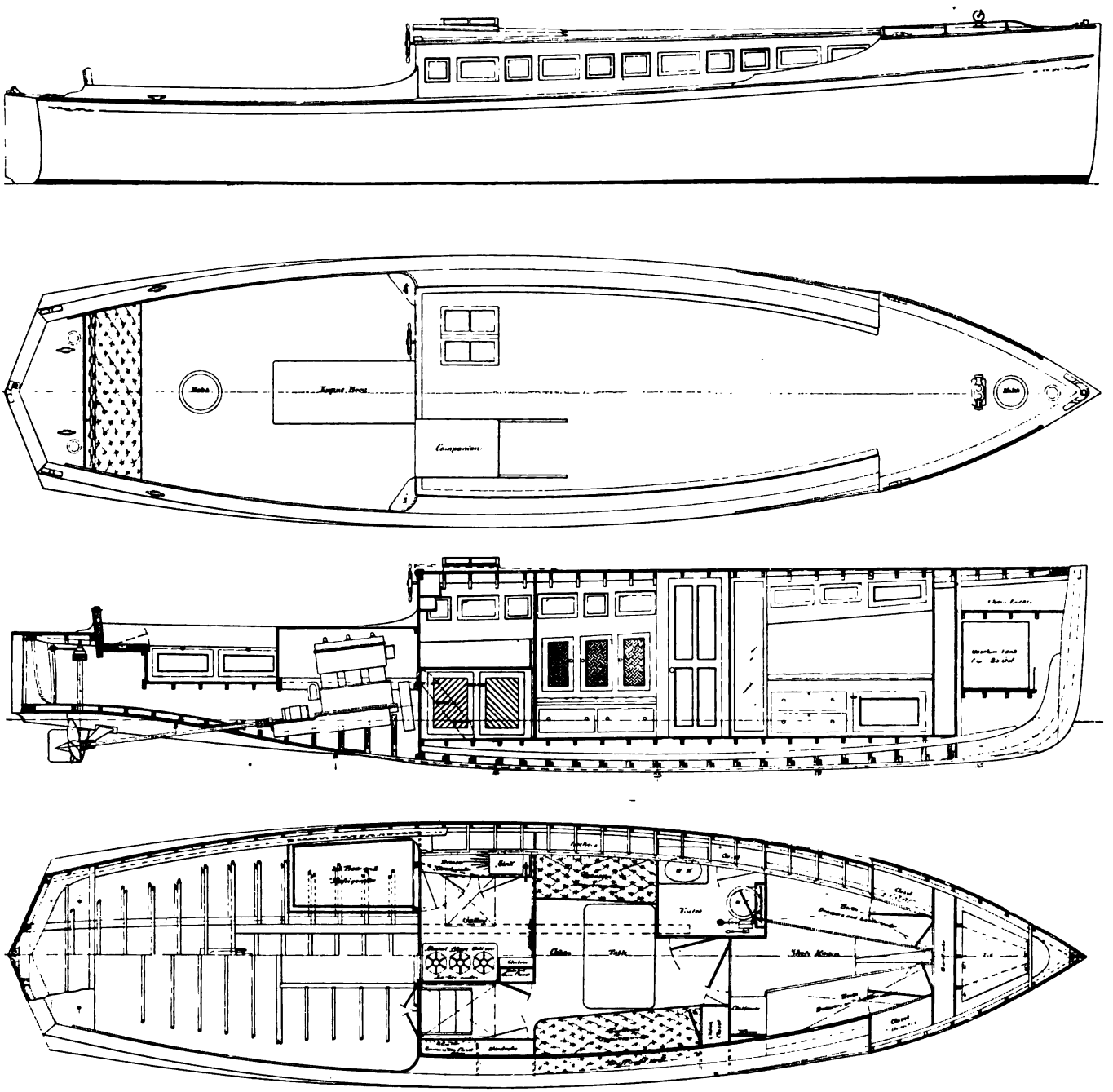

Valfreya, 42 Ft. 6 In. O. A. Designed by Henry J. Gielow, New York City, for Andrew D. Meloy

be thrown into one if desired. Forward of the forward cabin is a large forecastle or storeroom. Ordinarily, the engine room is to be used as a forecastle.

The sail plan is small and the sails easily worked by two men.

The principal dimensions are as follows:

Length o. a.	55	feet 0	inches
Length l. w. l.	41	" 0	"
Breadth	13	" 0	"
Draught	6	" 3	"
Overhang, bow	6	" 6	"
Overhang, stern	7	" 6	"
Freeboard, bow	5	" 3	"
Freeboard, stern	3	" 3	"
Freeboard, least	2	" 11	"
Total sail area	1,380	square feet	

VALFREYA

THE cruising power launch Valfreya was built by the Milton Boat Works from plans furnished by Henry J. Gielow, of New York, for Mr. Andrew D. Meloy, for use on the shoal water along the South shore of Long Island. She is of light draught, but her lines have been so modeled that she will possess good seagoing qualities as well. This combination has necessitated the introduction of a tunnel in which the screw works and is so arranged that in case of the boat grounding the screw will escape injury.

Her design is of the semi-raised deck type, the sides of the hull being carried up forward for a distance of 8 feet, aft of which there is a mahogany cabin trunk 17 feet in length, carried 12 inches inboard from the sides of the boat. The boat is intended for cruising as well as for

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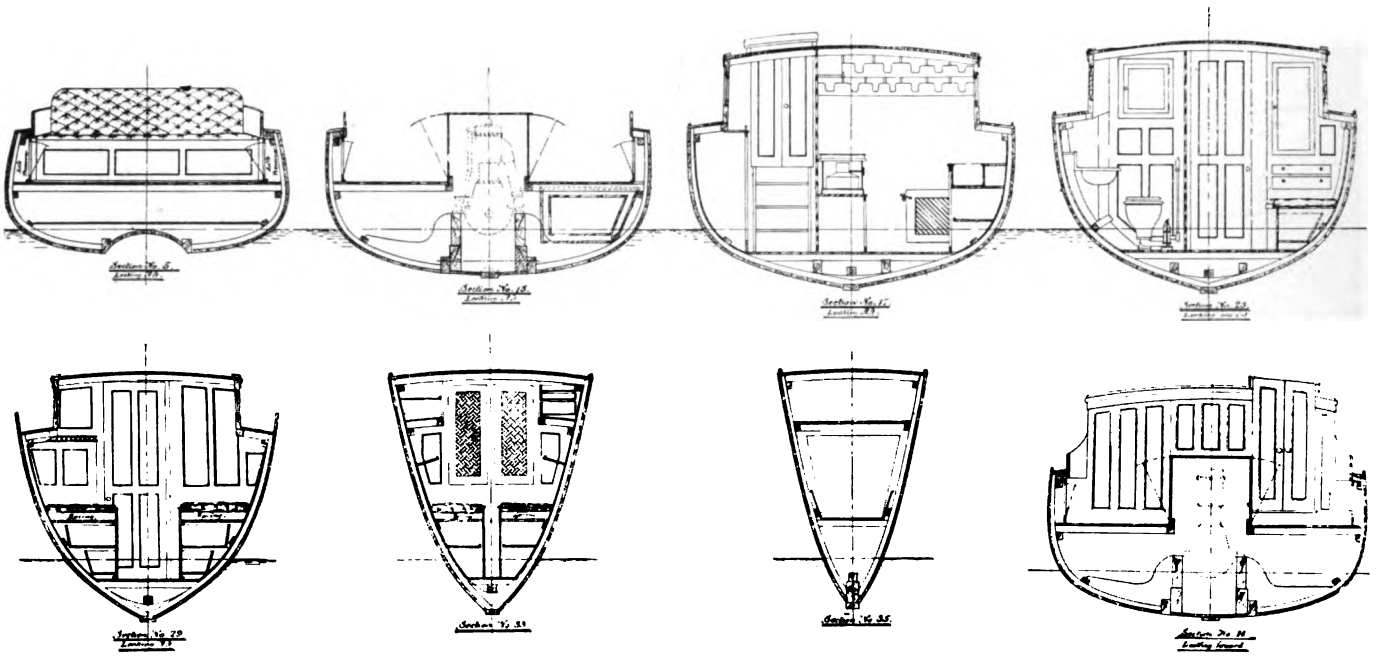


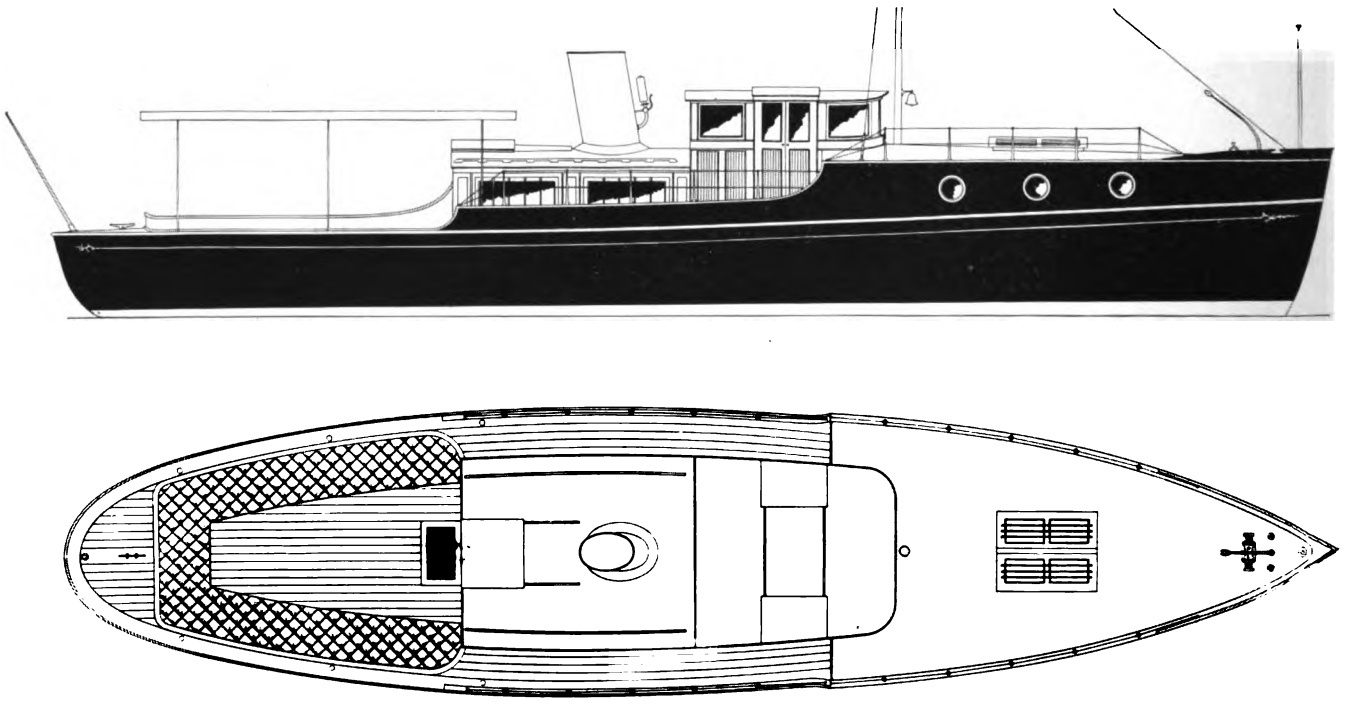
Sections of Valfreya 42 Ft. 6 In. Power Cruiser

day use, and has been arranged especially to meet Mr. Meloy's requirements. The collision bulkhead is 8 feet aft from the stem. Aft of this bulkhead is the owner's stateroom, 8 feet 6 inches in length and extending the full width of the boat, arranged with a berth on each side, a large wardrobe and two smaller closets at the forward end and a chiffonier in the after end on the starboard side. Aft of the owner's stateroom is the main cabin, 7 feet 6 inches in length and extending full width of the vessel, having divans along each side with lockers underneath. Forward on the starboard side is a china closet, and the space under the divans will be fitted to receive all the yacht's linen, etc.

The motive power consists of an 18-h.p. Standard engine which will give the boat a speed of 11 miles an hour. The materials of construction are of the very best throughout. All fastenings are of copper and composition; the interior finish is in white and gold, with mahogany furnishings finished in natural colors.

The principal dimensions of the craft are:

Length o. a.....	42	feet	6 inches
Length w. l.....	41	"	0 "
Breadth	10	"	0 "
Draught	2	"	0 "



Forty-Foot Cruiser. Designed by E. Drolet, Park Laval, Ontario, for W. V. Spencer, Portland, Oregon

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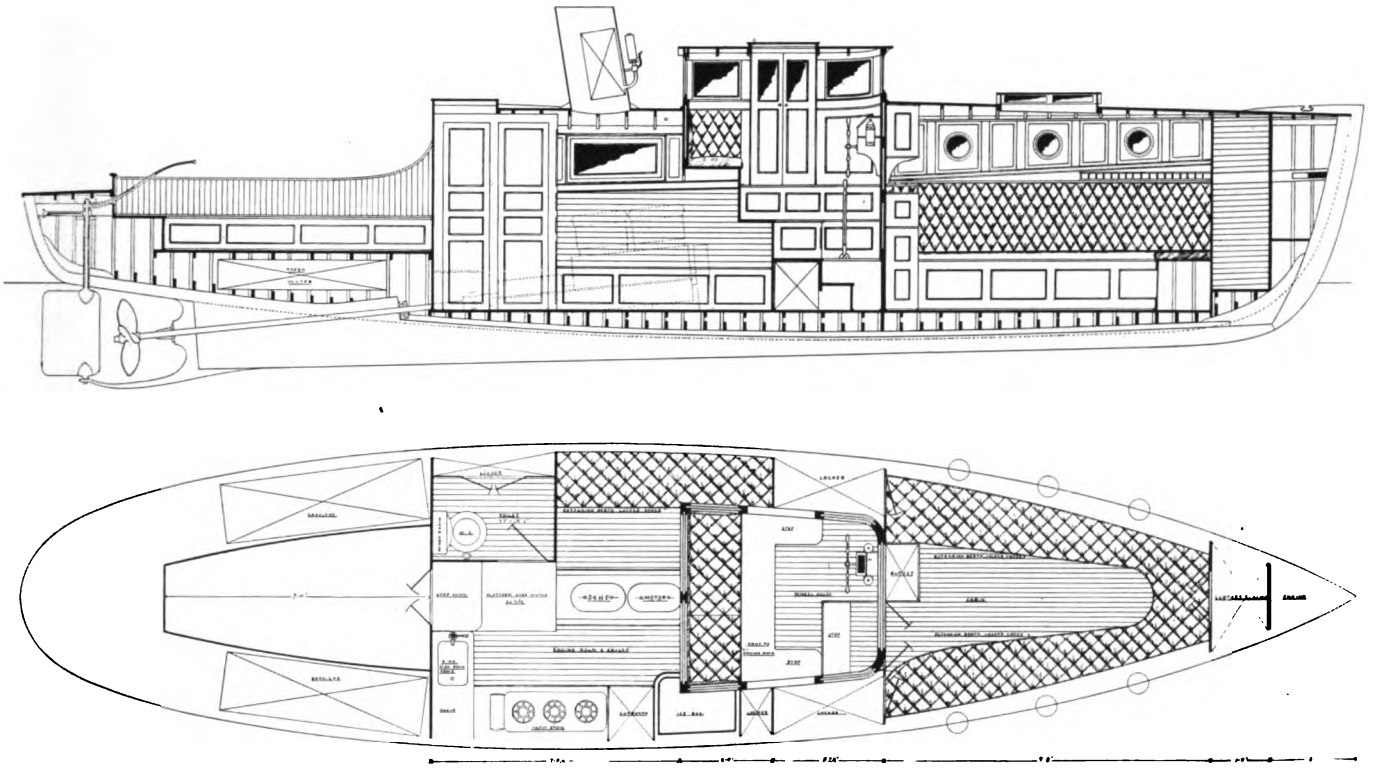

Accommodation Plan of Forty-Foot Cruiser

FORTY-FOOT HEAVY CRUISER

THIS craft was designed by E. Drolet, of Park Laval, Ontario, Can., for Mr. W. V. Spencer, of Portland, Ore., as a heavy cruising craft, capable of negotiating safely any weather likely to be encountered in the cruising season along the Pacific coast.

The boat is described by the designer as follows:

"The feature of this design is the protection afforded the helmsman by the central wheel-house, where all the controls for the engine are carried within reach of the man at the wheel. A comfortable cross seat is located immediately behind the helmsman, which affords a clear view of the surroundings and makes a comfortable lounging place in bad weather.

"The cockpit floor is well above the water-line, and is self-bailing through two large scuppers. On each side of the cockpit, under the side seats and fitted with drip pans open to the sea, are located the two gasolene tanks. A large fresh-water tank is located under the flood. An emergency hand tiller which can be unshipped is also fitted.

"There is a stout military mast with cross-arm for decorative as well as useful purposes. The dummy stack ventilates the engine room and also contains the air-tank for the whistle.

"The aim has been to utilize every bit of space. The engine is a 24-h.p. heavy-duty Buffalo. Accessories include air pump, tank and whistle and dynamo for ignition and lighting. The galley is located in the engine room and is fully equipped with cooking apparatus, ice-box and dish-rack; w. c. and wash-basin are located on the port side in the after end of engine room. Forward of this is provided a full size bunk with extension, for the engineer.

"The forward cabin has entension berths and swing-up Pullman upper berths. A small buffet and ample locker room is also provided."

The general dimensions of the craft are as follows:

Length o. a.....	40	feet	0	inches
Length w. l.....	38	"	0	"
Breadth	9	"	0	"
Draught	3	"	0	"

FORTY-EIGHT-FT. POWER CRUISER

THE plans following are from the board of W. E. Anderson, Albuquerque, N. M., and show a most complete cruiser for offshore cruising.

The general arrangement is laid out to sleep comfortably eight persons. In the forepeak is the chain and rope locker and also the fresh-water tank. Next is the forward stateroom containing two stationary berths with drawers under; this compartment is separated from the chain locker by a water-tight bulkhead. Next aft comes the engine room, containing a 28-h.p. heavy-duty Regal engine; the muffler and also the stove-pipe from the range in the galley lead up to the stack above. On the port side of the engine room is a locker for the engineer, work bench, and an iron ladder which gives access to the deck above. An eight-light Dayton outfit will furnish light for the boat and will be installed beneath the work bench. On the starboard side of the engine room is a locker seat for storing oil, waste, and packing, and a large locker for provisions, etc.

Next aft of the engine room is the galley the full width of the vessel and arranged to be as convenient as possible on the port side is a good size refrigerator taking up the full width of the galley; on the starboard side is a four-hole Shipmate range and a place for wood and coal. In the center is the sink with dish-racks above. Next aft of the galley comes the main saloon containing two extension berths; under these transoms will be installed cylinder tanks for carrying an extra supply of

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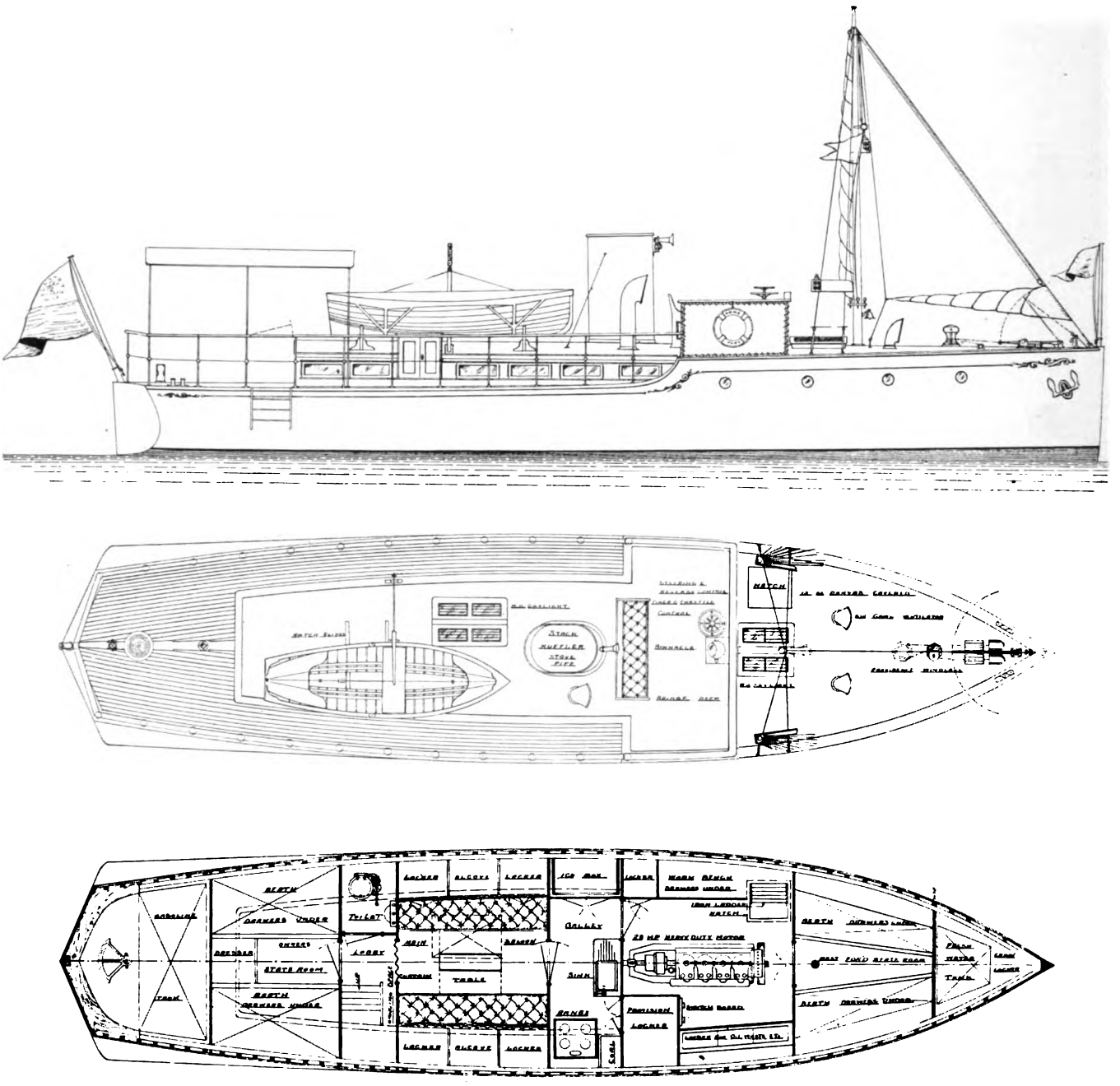

Forty-Eight-Foot Offshore Cruiser. Designed by W. E. Anderson, Albuquerque, N. M.

gasolene and above these transoms will be lockers and alcoves; there will also be a drop-leaf table. Aft of this compartment is the stairway leading to the deck above; there is also a small hanging space which will take in the lower part of the quadrant davit. Across from the stairway is the toilet with Sands' closet and lavatory.

The owner's stateroom is in the after end of the cabin and contains two wide stationary berths with drawers under, and also a good size dresser with mirror above. On deck the yacht will carry a 12-foot dinghy which will be raised and lowered by a quadrant davit. The mast will be stepped on top of keelson and is 17 feet 6 inches in height above top of deck, 4 inches in diameter at base, 3 inches at masthead. She carries two sails of sufficient area to steady her in rough weather or allow her to make port with a fair wind. On forward deck is a Providence capstan with chain stoppers, etc., adjustable anchor davits and two 6-inch ventilating cowls.

The boat will be entirely controlled from the bridge deck. The construction will be fairly heavy with white oak keel, keelson, stem and stern, steam-bent timbers, planking of long-leaf yellow pine, decks of white pine, and exterior of after cabin of white oak; the cabin interior will be finished in white oak and white enamel. A speed of 10 to 11 miles per hour is expected. The yacht is to be painted with black topsides, bronze cove and scrolls, white boottop, and green underbody.

General dimensions are as follows:

Length o. a.	48	feet	0	inches
Length w. l.	47	"	9	"
Breadth	11	"	0	"
Draught	3	"	8	"

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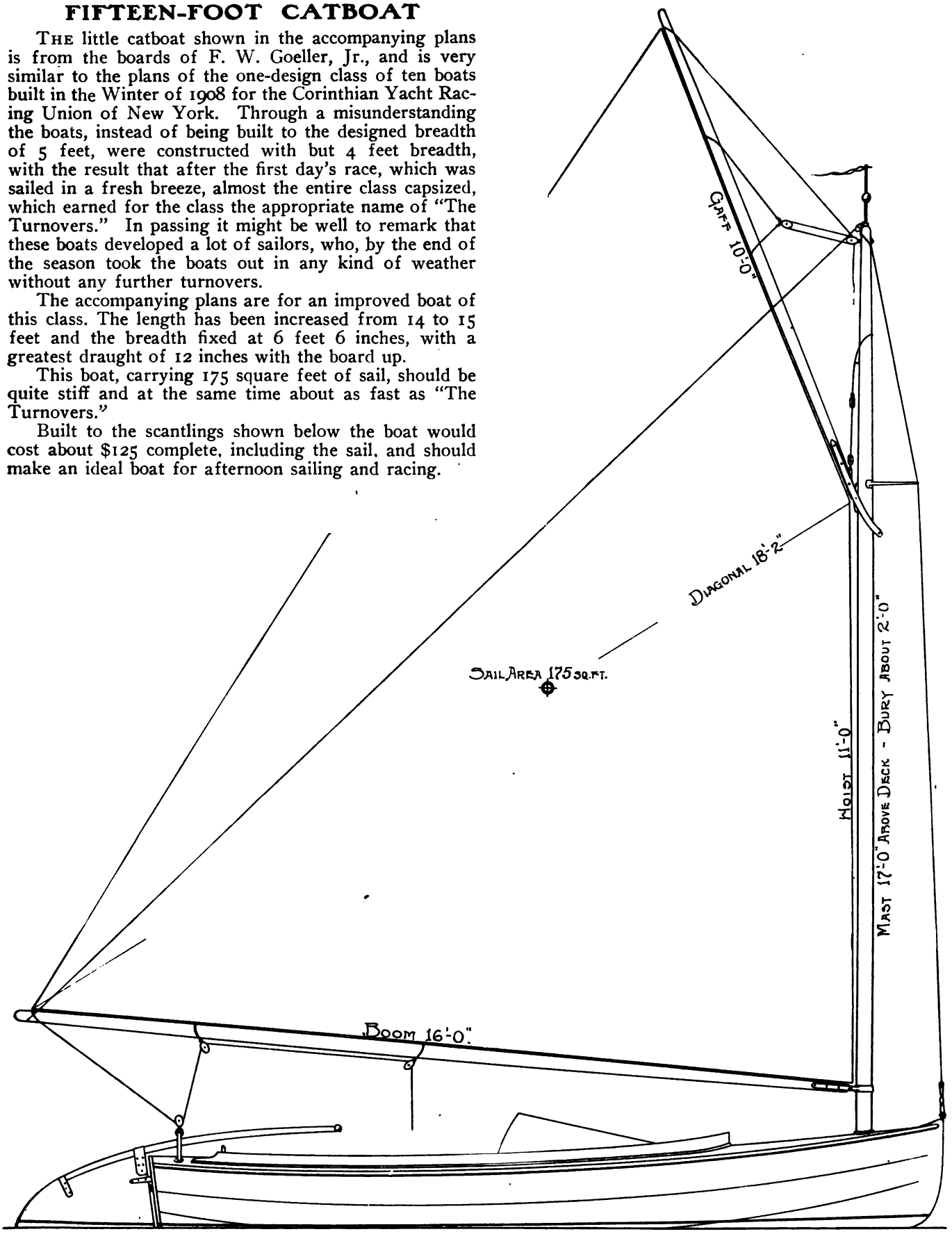
FIFTEEN-FOOT CATBOAT

THE little catboat shown in the accompanying plans is from the boards of F. W. Goeller, Jr., and is very similar to the plans of the one-design class of ten boats built in the Winter of 1908 for the Corinthian Yacht Racing Union of New York. Through a misunderstanding the boats, instead of being built to the designed breadth of 5 feet, were constructed with but 4 feet breadth, with the result that after the first day's race, which was sailed in a fresh breeze, almost the entire class capsized, which earned for the class the appropriate name of "The Turnovers." In passing it might be well to remark that these boats developed a lot of sailors, who, by the end of the season took the boats out in any kind of weather without any further turnovers.

The accompanying plans are for an improved boat of this class. The length has been increased from 14 to 15 feet and the breadth fixed at 6 feet 6 inches, with a greatest draught of 12 inches with the board up.

This boat, carrying 175 square feet of sail, should be quite stiff and at the same time about as fast as "The Turnovers."

Built to the scantlings shown below the boat would cost about $125 complete, including the sail, and should make an ideal boat for afternoon sailing and racing.



Fifteen-Foot Skipjack Catboat. Designed by F. W. Goeller, Jr. New York City

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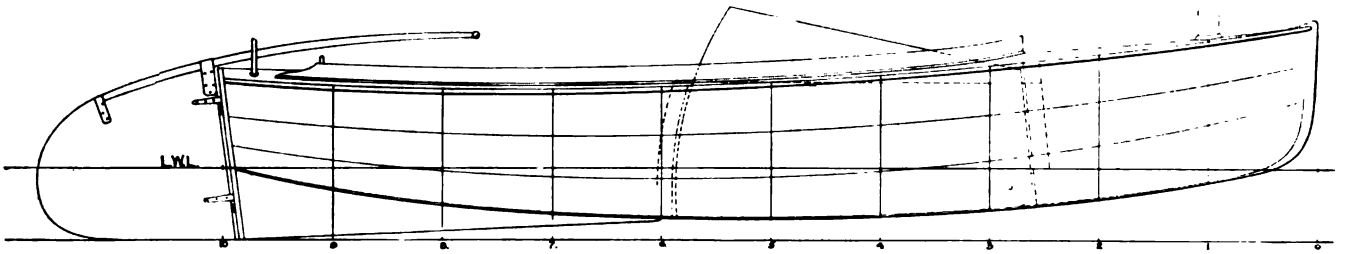

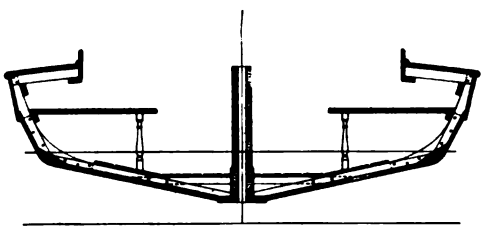

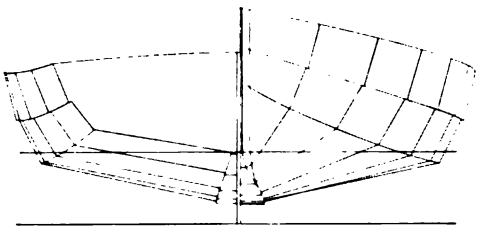

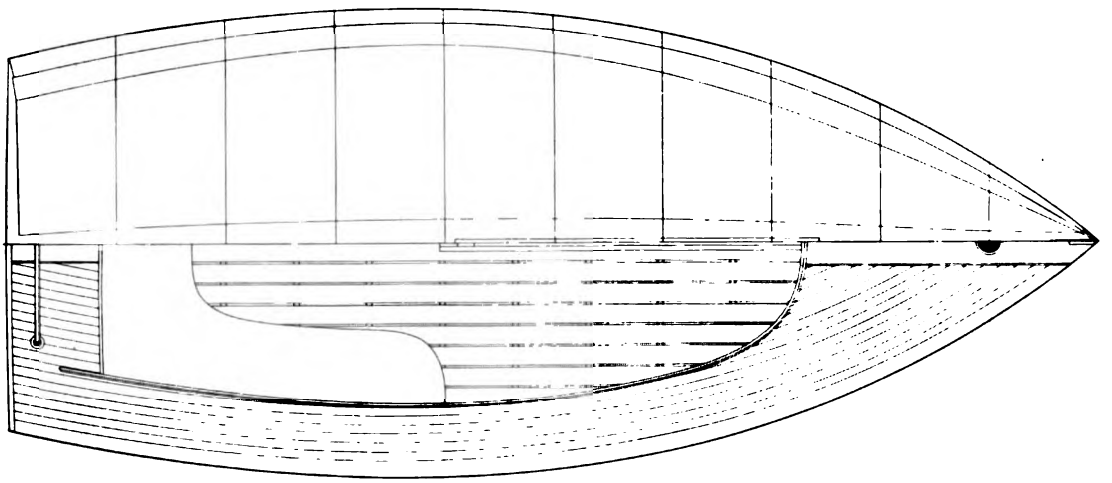

KEEL - OAK - 1" x 8" SPRUNG TO SHAPE AS SHOWN.
STEM - OAK - NATURAL CROOK - SIDED 3".
TRANSOM - OAK - 7/8" THICK.
FRAMES - OAK - 1" x 1" ON BOTTOM ~ 1" x 1¾" ON SIDES: SPACED 10" ¢ TO ¢.
KNEES - OAK - NATURAL CROOK - SIDED 7/8".
PLANKING { ON BOTTOM - CEDAR - FINISHED ¾". ON SIDES - CEDAR - FINISHED ½" - LAP RIVETTED.
DECK BEAMS - SPRUCE - 7/8" x 1¼" ON EVERY FRAME.
CLAMP - SPRUCE 7/8" x 1½".
DECK - WHITE PINE - FINISHED ¾" - BLIND NAILED.
CHIME PIECE - CEDAR - 2" x 6" - OUTSIDE CORNER WELL ROUNDED.
BED LOGS FOR CENTRE BOARD TRUNK - OAK - 1⅛" x 5 RUN WELL FORWARD AND AFT.
UPPER PART OF CENTRE BOARD TRUNK 7/8" x 5".
CENTRE BOARD AND RUDDER - YELLOW PINE - THROUGH DOWELED.

Lines and Scantling Table of Fifteen-Foot Skipjack Catboat

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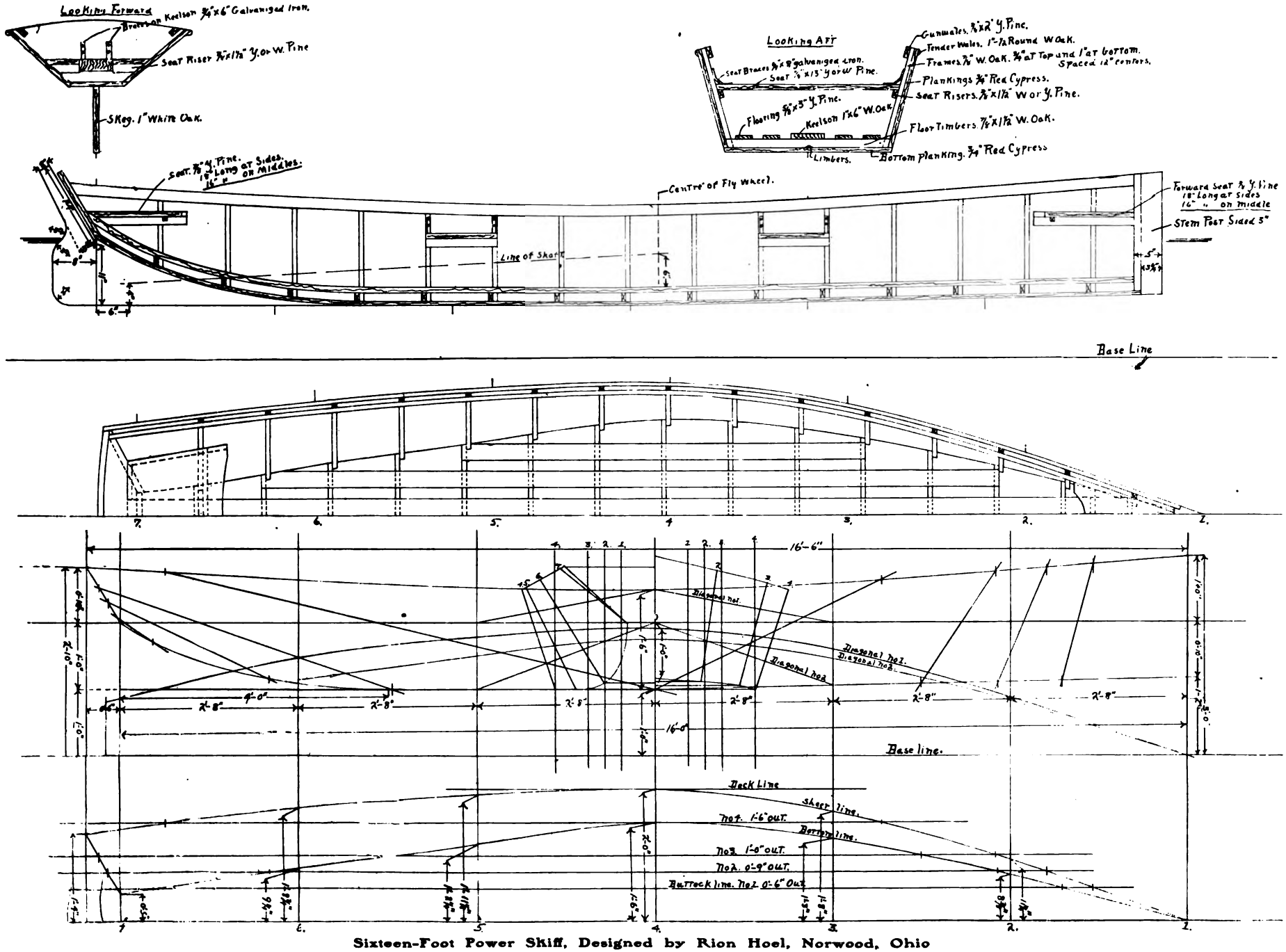
Looking Forward
Keelson ¾"x6" Galvanized Iron.
Breast-hook
Seat Riser ⅞"x11⅞" Y. or W. Pine
Skeg. 1" White Oak.
Looking Aft
Gunwales. ⅞"x2" Y. Pine.
Tender Wales. 1"-½ Round W. Oak.
Frames ⅞" W. Oak. ⅝" at Top and 1" at Bottom. Spaced 12" centers.
Seat Braces ⅞"x8" galvanized iron.
Seat ⅞"x15" Y. or W. Pine.
Plankings ¾" Red Cypress.
Seat Risers. ⅞"x11⅞" W. or Y. Pine.
Flooring ⅝"x3" Y. Pine.
Keelson 1"x6" W. Oak.
Floor Timbers. ⅞"x1⅛" W. Oak.
Limbers.
Bottom Planking ¾" Red Cypress
Seat ⅞" Y. Pine. 18" Long at Sides. 16" " on Middles.
Centre of Fly Wheel.
Forward Seat ⅞ Y. Pine 18" Long at Sides 16" " on Middle
Stem Post Sized 5"
Line of Shaft
Base Line
16'-6"
Diagonal No1.
Diagonal No2.
Diagonal No3.
Base line.
Back Line
Sheer line.
Bottom line.
No1. 1'-6" OUT.
No3. 1'-0" OUT.
No4. 0'-9" OUT.
Buttock line. No2. 0'-6" Out

Sixteen-Foot Power Skiff, Designed by Rion Hoel, Norwood, Ohio

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HOW TO BUILD A POWER DORY, COD

Fred W. Goeller, Jr.

IN building boats, as in everything else, to get started right means a great deal and while well begun is not always half done, the amateur boat-builder who does not get started right will find an almost endless series of obstacles to overcome.

In the first place the correct way to build a boat is to lay it down, or in other words, draw the plans full size on a fairly smooth floor. The smoother the better. In this way everything can be laid out and you can see what is needed at once. Also in a boat of this type with sawn frames one man can be getting these out while another is attending to some other detail.

In most boat-shops the floor is given a coat of quick-drying paint generally of a light gray color. This is done so that the pencil-marks show up clearly. This, however, is not necessary if the floor is fairly bright so that all lines may be readily seen.

First draw a line which will be the center line for the half-breadth plan, allowing enough space above it to get the profile. If cramped for room use this line also either for the base or the load water-line. Then on this line lay off 18 feet and erect perpendiculars at both ends. On these perpendiculars lay off a space 4 feet above the line for the base line and 21 inches above it a line for the load water-line.

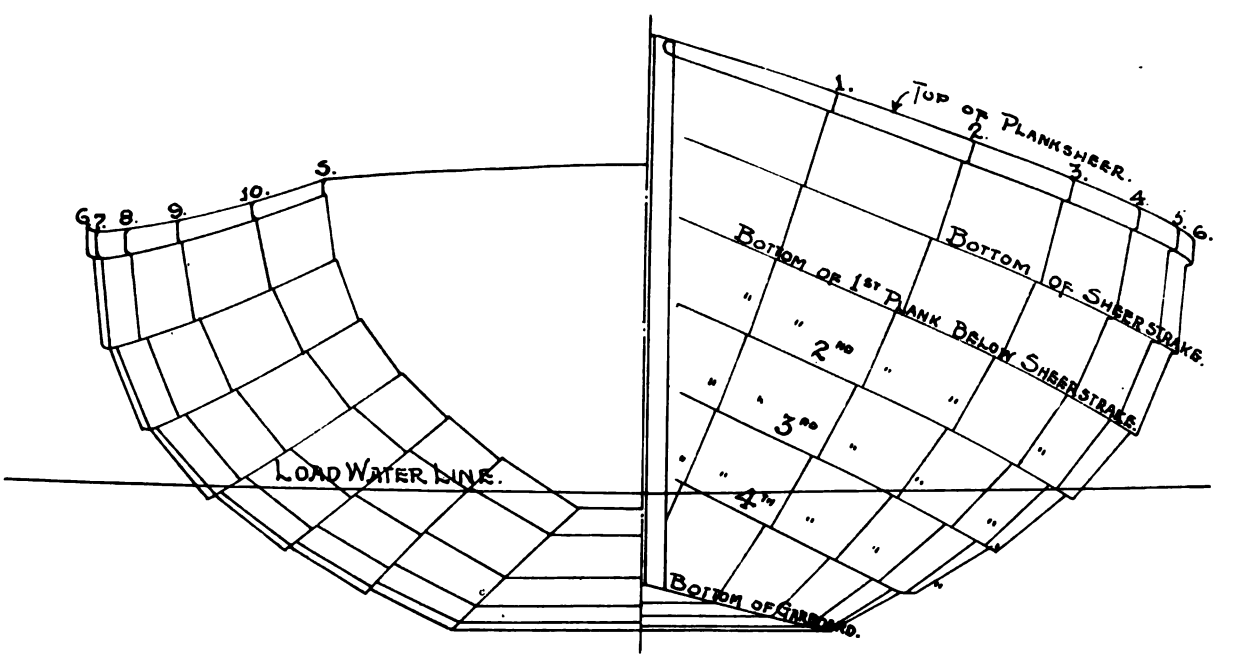
After these lines have been drawn, starting from the bow lay off the stations 20 inches apart both on the center line of the half-breadth plan and on the L.W.L., and draw lines running through them far enough above the L.W.L. to take in the sheer heights.

We are now ready to lay down the lines. From the table of offsets one column reads heights (given from the base line) and the other half-breadths. Starting on the heights—the line drawing gives the heights of the ends—lay off the top of the plank-sheer on station 1 and so on back to the stern. The other heights are given to the lower outside edge of each plank. In the half-breadths except the deck line, the dimensions given are taken from the same point.

After all the heights and breadths are laid out on the stations take a batten and bend it around and draw lines through these points. In this way you are always sure of getting a fair boat. Then lay out the sections using the same dimensions. If an unfair spot has been found in the lines anywhere it should be corrected so that the sections will be fair and true.

The method of laying off the planking and frames on the sections is fully explained on the line drawing.

Herein lies the advantage of drawing the boat full size on the floor. The bottom boards, stem and sternboard have now got to be cut out and fastened together. You can see at a glance just how much lumber you need for the various items.



Body Plan of Eighteen-Foot Power Dory

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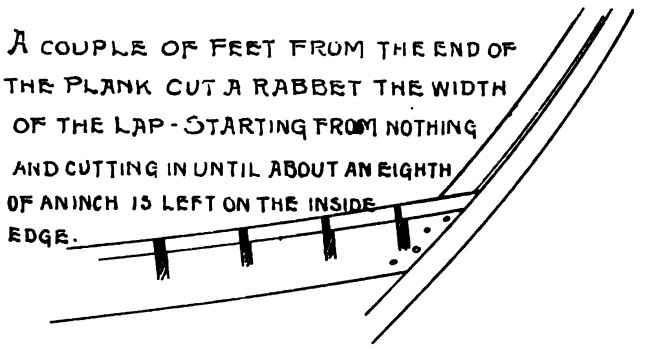

A COUPLE OF FEET FROM THE END OF
THE PLANK CUT A RABBET THE WIDTH
OF THE LAP - STARTING FROM NOTHING
AND CUTTING IN UNTIL ABOUT AN EIGHTH
OF AN INCH IS LEFT ON THE INSIDE
EDGE.

METHOD OF FINISHING LAPS FORWARD AND AFT.

When the bottom, stem and sternboard are all together, the moulds should be gotten out. These moulds are on every other frame and are left in the boat till the planking is finished and the laps riveted. They are then taken out and the regular frames put in.

Now we must have something to build the boat on. The stocks as shown are built that high so that a man can plank the boat without lying on his back. The backbone of the stock consists of a piece of spruce 2 inches by 12 inches on edge, with the top cut out to the shape of the bottom of the keel—allowing 1½ inches for the cross pieces between. If this is set on blocks 3 inches high, it can just be gotten out nicely with a shim on the after end where the stern runs up.

When the stocks are gotten out and thoroughly fastened together and to the floor, set the keel on it, lining this up true as well as the stem and sternboard and brace them well. The moulds are next put in place and fastened to the bottom boards and also braced. Bracing everything possible to the ceiling is the best plan, as it allows bending planks and working around without interfering with them.

When the moulds are in place and braced a ribband of 1 by 1½-inch spruce is bent around and fastened to each mould. The bottom of this ribband should be set at a height corresponding to the top of the plank-sheer.

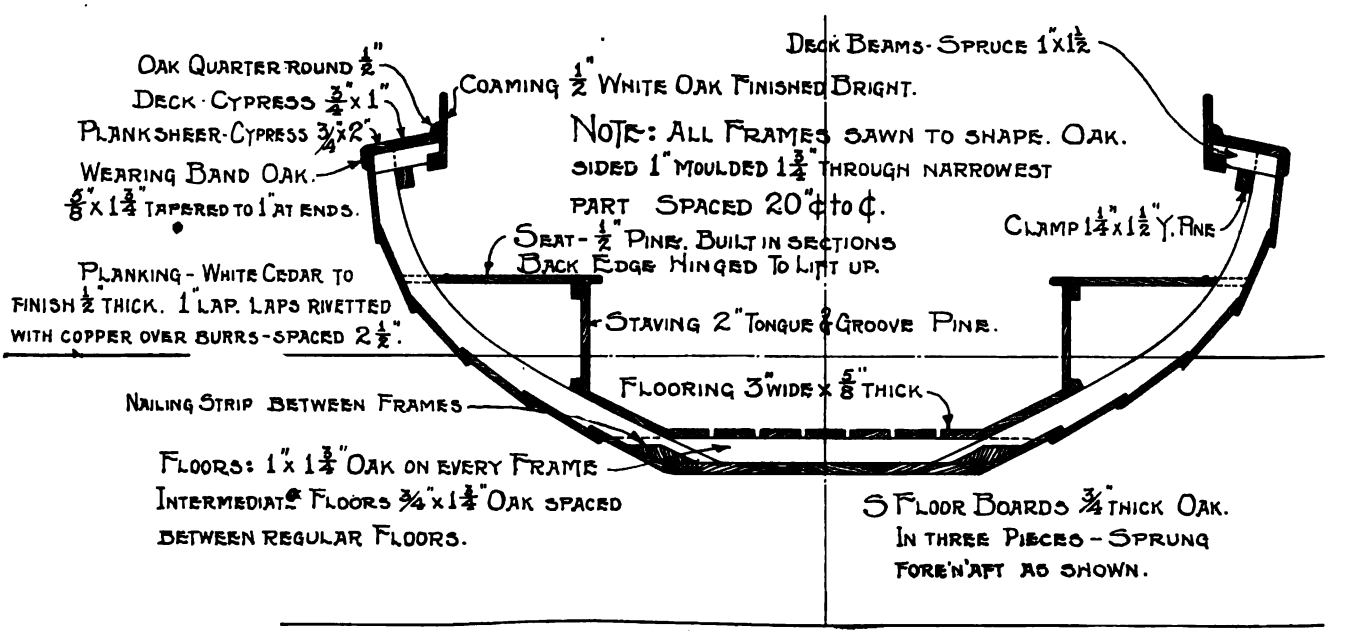
We are then ready to start planking. Probably the easiest way for the amateur is to get a few thin planks, say ¼ inch thick, and bend these around, shaving off the top edge till it fits in all the notches in the moulds. It may then be laid on the plank which is to be used and the top marked out. The bottom will then be easy, as with the stations marked on the plank the width may be taken off from the moulds, always allowing an inch for the lap. This operation is repeated until all the planks are out.

As the planking is gotten out it should be fastened to the moulds—do not drive the nails all the way in—and to the stem and sternboard, and the laps riveted. The detail shows how the laps, are finished forward and aft. The fastenings forward and aft are put in for keeps. The frames between the moulds may then be put in and fastened to the planking. When all these that can be put in are in, put tie pieces across the heads, and braces may now be put from the sheer-strake to the floor to prevent any spreading. The moulds may now be taken out and frames fitted in their place and the planking fastened to them.

We are now ready to put in the clamp. This is yellow pine 1¼ inches by 1½ inches, and it is fastened thoroughly to every frame and to the stem. Where the two (one on either side) meet they are joined together with a knee. This clamp should be placed below the top of the frames far enough so that when the deck beams rest on it they (the beams) are at just the right height for the deck.

With several ties across from the clamps and frames the boat may now be moved off the stocks, and the dead-wood put on. This should be laid out from the drawing on the floor and its position on the keel carefully marked. This dead-wood consists of three pieces. The middle one, which is also the shaft log, is 8 inches wide by 2 inches thick, and the top and bottom pieces thoroughly fastened to it with galvanized iron screws, and the whole fastened to the keel with lag-screws bolted down through it.

If this has been laid out very carefully and there is no doubt about its fitting in the correct place the hole may be bored for the shaft. To do this one would have


OAK QUARTER ROUND ½"
DECK - CYPRESS ¾" x 1"
PLANK SHEER - CYPRESS ¾" x 2"
WEARING BAND OAK. ⅝" x 1¾" TAPERED TO 1" AT ENDS.
PLANKING - WHITE CEDAR TO FINISH ½" THICK. 1" LAP. LAPS RIVETTED WITH COPPER OVER BURRS - SPACED 2½".
NAILING STRIP BETWEEN FRAMES
FLOORS: 1" x 1¾" OAK ON EVERY FRAME
INTERMEDIATE FLOORS ¾" x 1¾" OAK SPACED BETWEEN REGULAR FLOORS.
COAMING ½" WHITE OAK FINISHED BRIGHT.
NOTE: ALL FRAMES SAWN TO SHAPE. OAK. SIDED 1" MOULDED 1¾" THROUGH NARROWEST PART SPACED 20" ¢ to ¢.
SEAT - ½" PINE. BUILT IN SECTIONS BACK EDGE HINGED TO LIFT UP.
STAVING 2" TONGUE & GROOVE PINE.
FLOORING 3" WIDE x ⅝" THICK
DECK BEAMS - SPRUCE 1" x 1½"
CLAMP 1¼" x 1½" Y. PINE
5 FLOOR BOARDS ¾" THICK OAK. IN THREE PIECES - SPRUNG FORE'N'AFT AS SHOWN.

Scantling Details of Eighteen-Foot Power Dory

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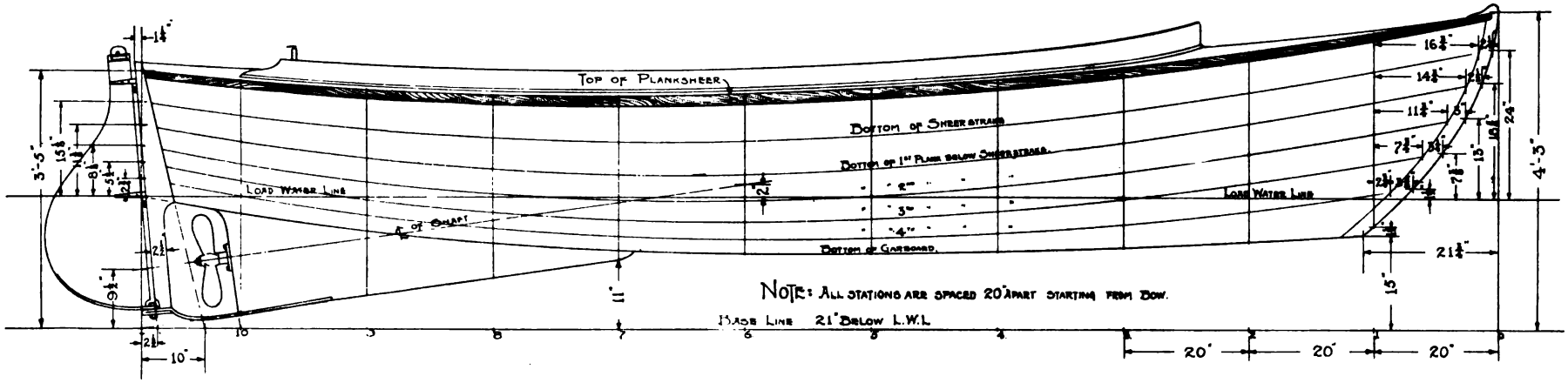

Top of Plank Sheer
Bottom of Sheer Strake
Bottom of 1st Plank below Sheer Strake
" 2nd " " "
" 3rd " " "
" 4th " " "
Bottom of Garboard
Load Water Line
Load Water Line
Base Line 21" below L.W.L.
NOTE: All stations are spaced 20" apart starting from Bow.
20"
20"
20"

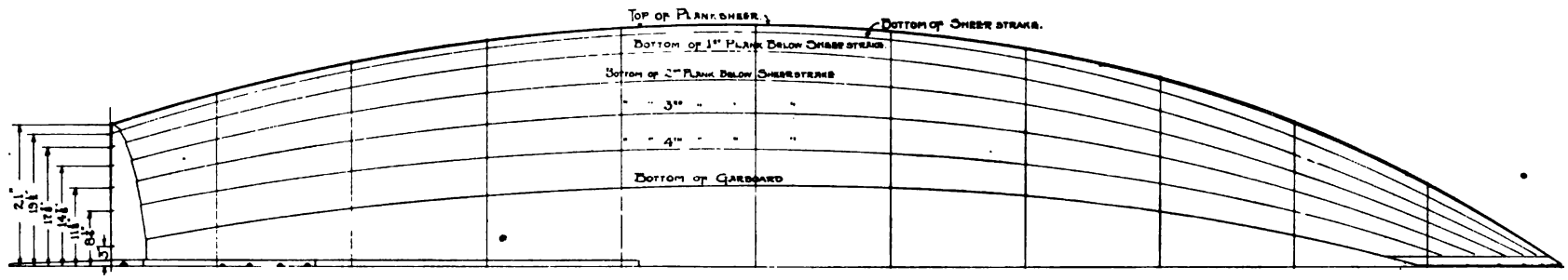
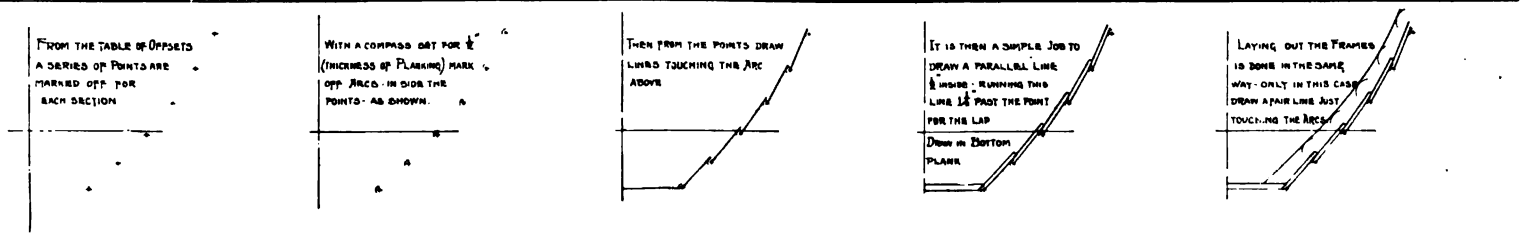

Top of Plank Sheer
Bottom of Sheer Strake
Bottom of 1st Plank below Sheer Strake
Bottom of 2nd Plank below Sheer Strake
" 3rd " " "
" 4th " " "
Bottom of Garboard

Table of Offsets

Dimensions given in Feet, Inches and Eighths: See Note Below.

	Heights											Half Breadths.									
Top of Plank Sheer	3 11.3	3 8 2	3 5 5	3.3.5	3.2.2	3 1 3	3 1 0	3 1 2	3.2 0	3 3 4		1.0 4	1.9.5	2 4.2	2.8.5	2.11.1	3.0.0	2.11 5	2 9 5	2.6.8	2.1.5
Bottom of Sheer Strake	3 5.2	3 1 6	2.10.6	2.8 3	2.6.6	2 5 7	2 5.6	2 6 3	2.7 5	2 9.7		0.10.4	1 7 3	2 2.0	2.6.7	2 9.6	2.10.7	2 10.4	2.8 3	2 5.0	2 0.3
Bottom of 1st Plank below Ss	3 0 2	2 8.6	2.5.5	2.3.1	2.1 3	2.0 4	2.0 4	2.1 3	2 3.1	2.5.6		0.8 4	1.4.6	1.11.2	2 3.7	2.6.7	2.8.0	2 7.6	2.5.7	2.2.4	1.10.0
" 2nd " "	2.7 2	2 3.7	2.1.0	1.10.5	1.9.1	1.8.3	1 8.4	1.9 4	1 1 3	2.2.1		0.6.5	1 2.1	1 8.0	2.0.2	2.2.6	2.3.6	2 3.4	2.1.6	1.10.7	1.6.7
" 3rd " "	2.2.3	1.11.2	1.8.5	1.6.6	1.5.4	1 5.0	1.5.3	1 6 4	1.8.4	1.11 4		0.4 5	0.11 3	1.4 3	1.8.0	1.10.1	1.11 0	1 10.5	1 9.1	1.6.5	1.3.1
" 4th " "	1 9.5	1.6.6	1.4.5	1.3.2	1.2.4	1.2.2	1.2.6	1.4 0	1 6.0	1 9.0		0.3.3	0.8.3	1.0.3	1.3.2	1.4.7	1.5.5	1.5.3	1 4.1	1 2.1	0.11.1
of Garboard		1.2.0	1.1.0	1.0.3	1.0.0	1 0.0	1 0 4	1.1 5	1 3.4	1 6.2			0.4.6	0.8.2	0.10.5	0.11.7	1.0.0	0.11.6	0.10.4	0.8.5	0.5.7
Stations	1.	2.	3.	4.	5.	6	7	8	9	10.			1	2.	3	4.	5.	6.	7.	8.	9.	10.


From the table of Offsets a series of Points are marked off for each Section
With a compass set for ½" (thickness of Planking) mark off Arcs in side the Points - as shown.
Then from the Points draw lines touching the Arc above
It is then a simple job to draw a parallel line ½" inside - running this line 1¼" past the Point for the Lap
Draw in Bottom Plank
Laying out the Frames is done in the same way - only in this case draw a fair line just touching the Arcs

Lines and Table of Offsets of Eighteen-Foot Power Dory

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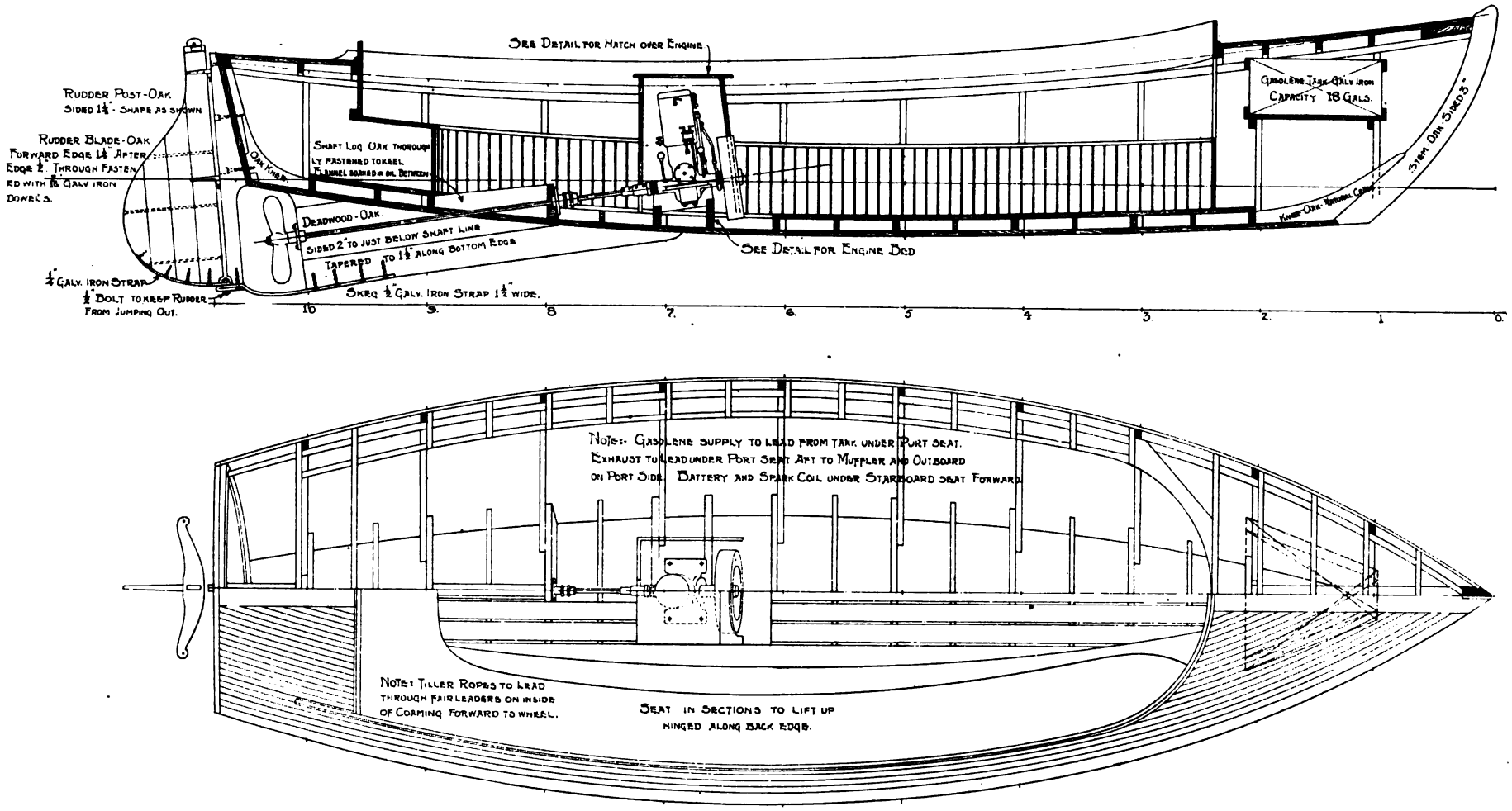
See Detail for Hatch over Engine
Rudder Post-Oak
Sided 1¼" - Shape as shown
Rudder Blade-Oak
Forward Edge 1¼" After Edge ½". Through Fasten ed with ⅝ Galv Iron Dowels.
Oak Knee
Shaft Log Oak thoroughly fastened to keel
Flannel bedded in oil Between
Deadwood-Oak.
Sided 2" to just below Shaft Line
Tapered to 1½" along Bottom Edge
¼" Galv. Iron Strap
½" Bolt to keep Rudder From Jumping Out.
5 Req ½" Galv. Iron Strap 1½" wide.
See Detail for Engine Bed
Gasolene Tank-Galv Iron Capacity 18 Qals.
Keel Oak-Natural Crook
3 Rib Oak-Sided 3"
16
15
8
7
6
5
4
3
2
1
0
Notes:- Gasolene supply to lead from tank under Port seat.
Exhaust to lead under Port seat Aft to Muffler and Outboard on Port Side. Battery and Spark Coil under Starboard seat Forward.
Note: Tiller Ropes to lead through fair leaders on inside of Coaming Forward to wheel.
Seat in Sections to lift up hinged along back edge.

Construction Plan of Eighteen-Foot Power Dory

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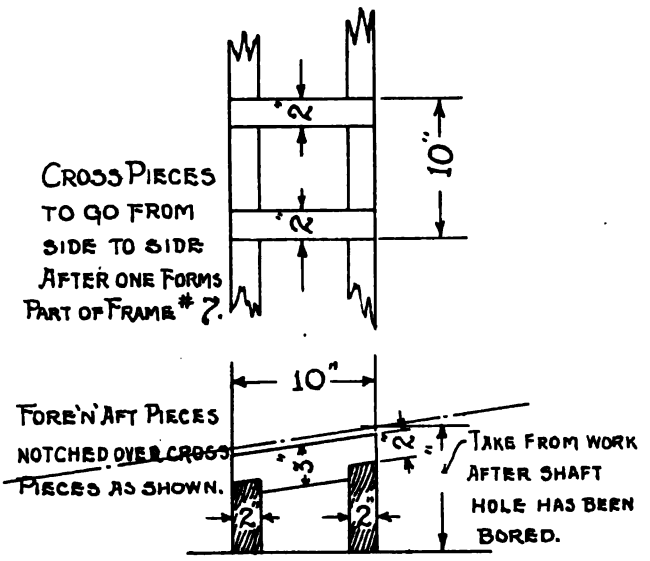
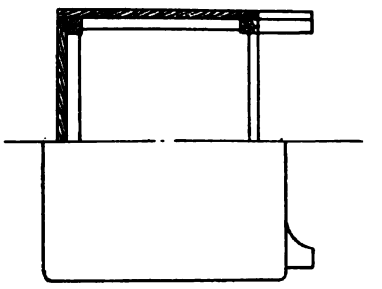
to be positive what make of engine is to be used and then they would know what size shaft was furnished with it; but I guess it would be better to let the boring go until the inside log is in and bolted up. Then if one has never bored a shaft, my advice would be to get some one who had, as it is worth the price to be sure you are going to get a straight hole.

When the hole is bored, the engine foundation may be put in place. This simply consists of two 2-inch pieces carried across from side to side, one of which forms a frame, and of sufficient height that when the fore-and-aft pieces are put on it will be just right to take the engine. Of course it is to be expected that something may have to be shaved off or even that some



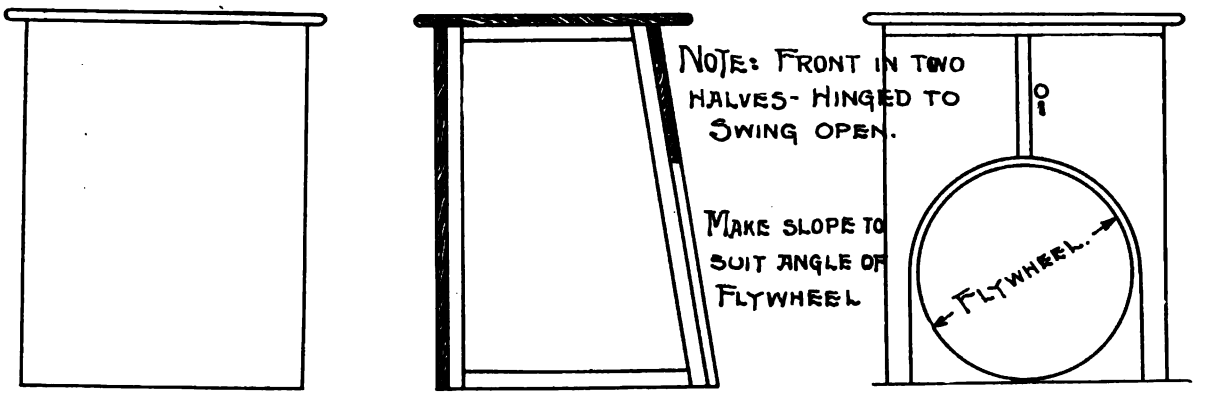
ENGINE FOUNDATION.



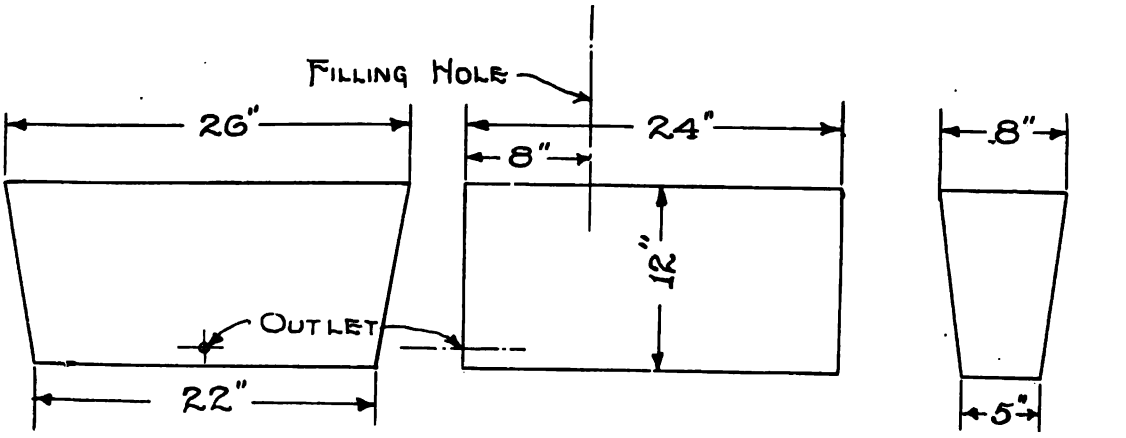
TOP VIEW.

HATCH OVER ENGINE.

TAKE DIMENSIONS FROM WORK AFTER ENGINE IS INSTALLED MAKE LARGE ENOUGH TO REACH ALL PARTS OF ENGINE FROM FRONT.



BACK VIEW. SECTION FRONT VIEW.



AFTER END SIDE ELEVATION FORWARD END

GASOLENE TANK. GALV. IRON.

Engine Foundation and Hatch Details, and Fuel Tank Plan

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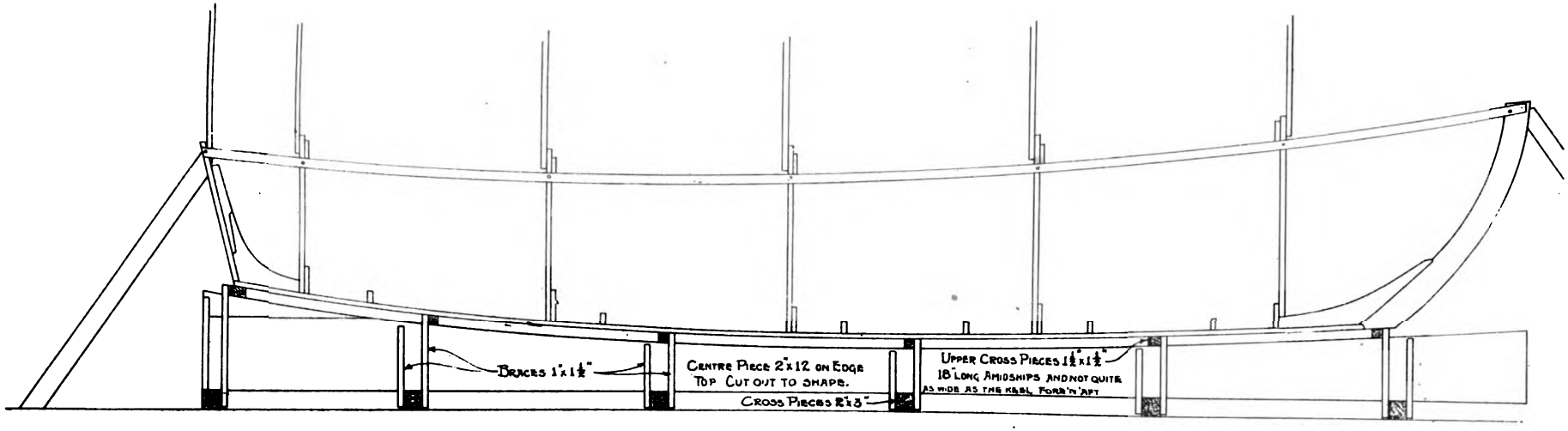
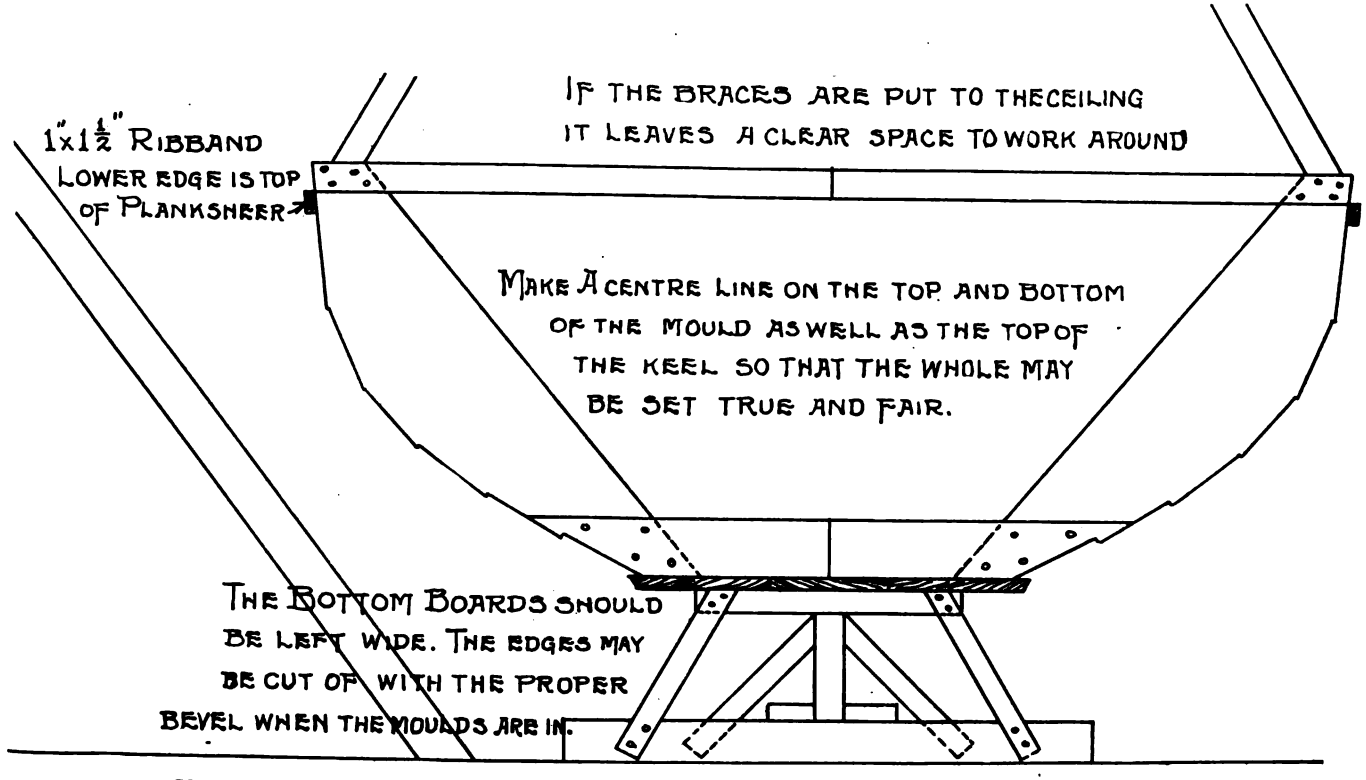

Braces 1"x1½"
Centre Piece 2"x12 on Edge
Top Cut out to Shape.
Cross Pieces 2"x3"
Upper Cross Pieces 1½"x1½"
18' Long Amidships and not quite
as wide as the keel, Forw'd and Aft

Set up on the Stocks.


1"x1½" Ribband
Lower edge is top
of Plankshear
If the braces are put to the ceiling
it leaves a clear space to work around
Make a centre line on the top and bottom
of the mould as well as the top of
the keel so that the whole may
be set true and fair.
The Bottom Boards should
be left wide. The edges may
be cut off with the proper
bevel when the moulds are in.

Showing Method of Setting Up Eighteen-Foot Power Dory on the Building Stocks

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liners may have to be put on; but the former is the best way to make it.

Long before this stage has been reached, the gasolene tank should have been ordered, so that it may be put in before the deck goes on. It should be thoroughly braced in every possible way so that there is not the least chance of any knocking around, which will cause a leak in this style of tank quicker than anything else. When it is in place and securely fastened the deck beams may be put in and the deck laid.

The deck beams are spruce 1 inch by 1½ inches spaced as shown on the construction plan. The deck, as shown, is ¾ by 1-inch cypress, with a 2-inch plank-sheer sprung to shape around the outside. The rest of the deck is sprung inside of this and follows the side of the boat. There is an oak king-plank 6 inches wide by 1 inch thick on the center line forward and aft. The edges are beveled to the thickness of the deck. In this way holes may be bored for filling the gasolene tank and cleats, etc., fastened on it without danger of pulling up the deck or causing leaks. On the underside of the deck beams in the way of the cockpit there is a 1 by 1¼-inch piece over which the deck beams are notched. They are also fastened to it.

We have now come to the only job that needs a steam-box,—putting the coaming on. The bend at the forward end is too small to stand bending cold, so a form will have to be made and the plank bent around it. If a steam-box is impossible to secure, put a lot of rags around it and pour boiling water on them; meanwhile coax it all the time. When it has the proper shape put it in and screw it up tight all around, starting from the middle forward and working back on either side. It can be screwed into the deck beams and to the carlin on which the deck beams rest. All that then remains is to put on the rudder-post as shown, and have a skeg made and put this on, fastening it to the rudder-post with one screw to hold it steady at the lower end. In making the rudder it is easier to use narrow pieces as shown, for then the holes for the dowels can be bored truer. Regular stock gudgeons will serve to hang the rudder with the ½-inch bolt as shown in the skeg to prevent its jumping out. For steering there are two ways, either the yoke as shown, or for those who prefer, a tiller. Take your choice.

The engine and shafting should now be put in and lined up, and before the seats are in the supply pipe and the exhaust and muffler should be placed in position and fastened. Be sure that when the exhaust is put through the sternboard the water will not flow into it, or in other words, put it up high enough.

The seats may now be put in. The forward part is of 2-inch tongue-and-groove staving and is built around to the shape of the boat as shown. The tops are in sections about 30 inches long, hinged along the back edge so that they can be lifted up and the space below utilized for locker space.

When all this is done, give her a finishing coat of varnish and paint wherever it is needed, and all that remains is for some pretty girl to break a beribboned bottle on her bow, and splash! the fun has begun.

THE SPRAY

LAST year, shortly after the now famous picture of Half-Moon was issued, a man from a New England City came into the office and asked the price of 10,000 copies, to be used by a large Insurance Company as an advertisement. He said the officers of the Company had admired the picture, and were agreeable to pay a good price for copies of the picture, or for the use of the plates.

I called his attention to the advertisement, in which it was stated that none of the reproductions of Half-Moon would be sold. He read it over, and then said: "Oh, that is the usual publisher's bluff." "No," said I, "it isn't; our word has been given, and you can't buy a single copy of that Half-Moon for ten thousand dollars." He has a copy now hanging in his office, but he had to subscribe to get it.

The Half-Moon plates are destroyed, the fire did it, and saved me the job; the last seven copies were burned, and THE RUDDER COMPANY to-day does not own a single impression. I shall personally destroy the Spray plates, and my word is pledged that no copies of that picture will be sold or given away, and that none will be issued except to subscribers.

Those who have subscribed or renewed since the Half-Moon went down are entitled to a copy of Spray, and it will be sent to you. If a subscriber sends in a subscription for another man, one who is not a subscriber, a copy will be sent to him, and a copy to the new subscriber.

I advise sending in at once, as the edition is limited, and probably will not last over the December rush.

[EDITOR.]

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THE NATIONAL CARNIVAL

LATE in the Summer of every year there is held on the Hudson River abreast of New York City the annual regatta of the National Association of Engine and Boat Manufacturers, which series of races has become known as the National Carnival, and usually brings out the best boats of the year. The program generally provides long-distance races and a three-days' series of races for the Championship Cups of the Association, the Motor Yacht Trophy, the International Trophy, the National Trophy, the Cabin Launch Trophy and the Inter-State Trophy. This assortment of races provides competition between boats of every type.

This season the Carnival was held September 21st to 24th inclusive, the first day's events being the long-distance contests for both speed boats and cruisers. The race for the first-mentioned class being to Poughkeepsie and return, and the latter to Peekskill and return, the distances being approximately 115 and 60 miles respectively. On the first day the weather was favorable and the boats covered the courses without difficulty and in good time. The speed boats were started off at 9:35 a. m. and got away practically together, and at 9:40 the cruisers, fifteen in all, divided into two classes, got underway, and they provided a pretty spectacle as they started off on their long journey. In the speed class Peter Pan III was first home with a new record for the course, and getting the prize for the fastest elapsed time, Edith II winning the race on corrected time. In the large cruiser class Avis and Edmee finished but five seconds apart, but the race went to Eronel, the winner of the last Bermuda Race, on corrected time. In the smaller class Elmo II, winner of so many long-distance races, secured first prize without much trouble.

SUMMARY

NATIONAL CARNIVAL, LONG DISTANCE RACES, SEPT. 21, 1910

SPEED BOATS—START 9:35—COURSE 115 NAUTICAL MILES

Boat and Owner	Elapsed Time H. M. S.	Corrected Time H. M. S.
Edith II. A. E. Smith	5:48:21	3:17:45
Peter Pan III., J. Simpson	5:22:43	3:32:13
Vanish, W. T. Reed	5:47:23	3:58:02
Teaser, H. Z. Pratt	7:13:45	5:15:39
Sand Burr, A. & C. White	6:41:09	6:35:03

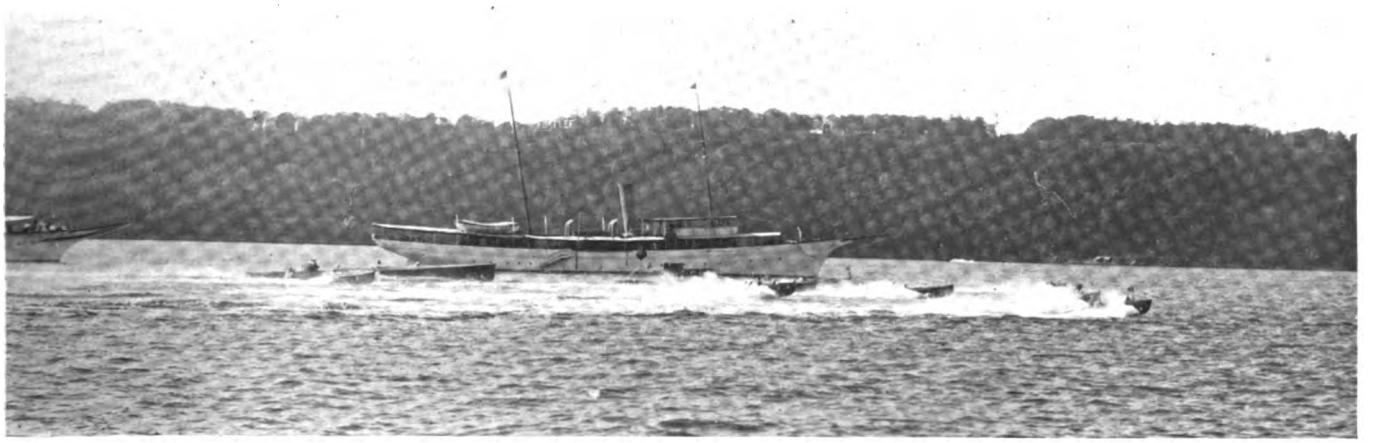
Rapier, S. Schieffelin; It, Charles Mallory; Ibis, D. E. Cronin; Red Raven, P. A. Saitta; Gunfire II., W. J. Brainard, did not finish.

CRUISING BOATS—CLASS D—START 9:40—COURSE 60 NAUTICAL MILES

Eronel, Samuel Cochrane	5:47:09	3:50:39
Caroline, M. F. Dennis	6:20:06	3:55:44
Spindrift, C. R. Butler	6:08:47	4:02:58
Avis, F. C. Havens	4:32:51	4:19:25
Wanderlust, Ed. J. Steiner	5:07:33	4:24:31
Edmee, R. J. Schaefer	4:32:56	4:29:58
Marie, L. Neumann, M. D.	5:38:35	4:31:48
Wyandance, R. J. Stafford	4:56:25	4:56:25

CRUISING BOATS—CLASS F—START 9:40—COURSE 60 NAUTICAL MILES

Elmo II., F. D. Giles, Jr.	6:28:11	4:26:19
Gracelda, D. R. Brinsmade	6:46:01	4:48:12
Dell, J. H. Cassidy	5:25:50	4:59:34
Quadrant II., A. P. Lundin	5:31:28	5:06:24
Kathmar, R. T. Fowler	5:08:55	5:08:55
Hie On, O. D. Thees	6:10:04	5:11:57
Nutmeg, W. A. Strong	6:40:20	5:19:28



Start of the Long-Distance Race for Speed Boats

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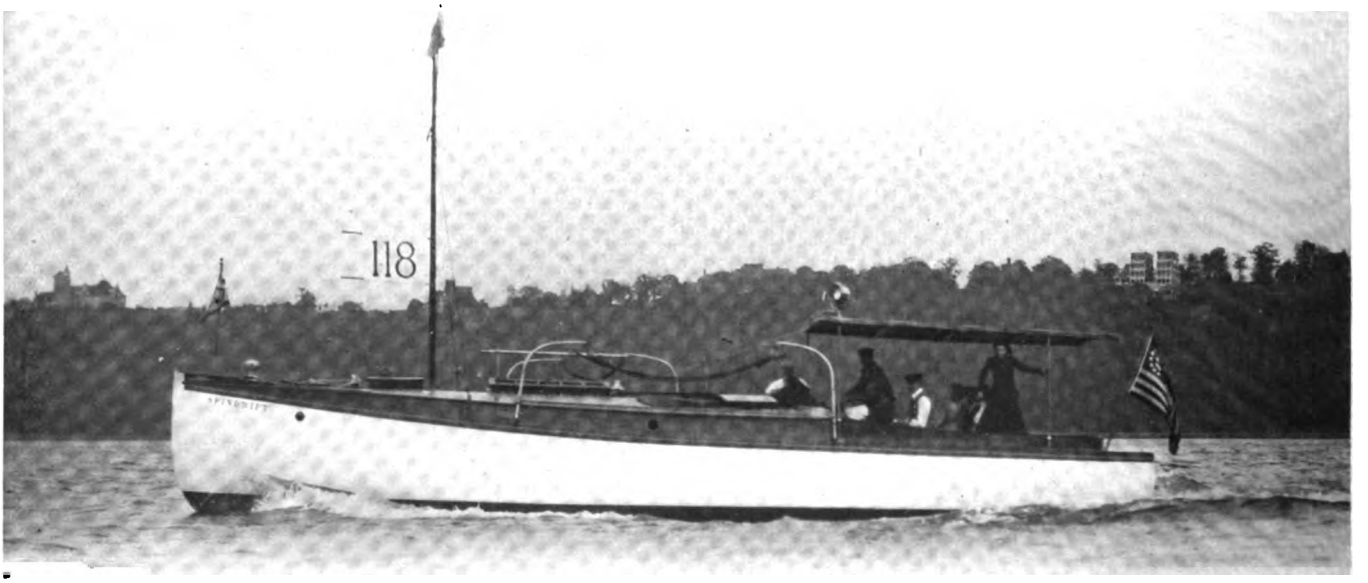
Avis. Owned by F. C. Havens

On the second day the first of the three-days' series races took place, twenty-five boats competing in the various classes, and while the fastest time was made by the big 60-footer Tartar, which craft covered the course of 30 nautical miles in 1 hour, 1 minute, and 12 seconds, the most interesting race of the day was provided by the Class A speed boats of 30 feet and under, the winner being Edith II, which little craft (she is only 20 feet) had the day before won the long-distance race in her class. In the class of 40 feet and under, Restless and Nameless, two craft built for the International Race, competed, Restless with her two screws winning over Nameless, with her four engines and 32 cylinders. In the cruising class the entries did not come up to expectations and some of the classes were a little shy of competitors. Avis easily beat Caroline in the class for cruisers over 40 feet, and Spindrift, in the class for cruisers under 40 feet Class E, won from Eronel; but as Eronel broke down it was not a difficult task. In Class F, for cruisers under 40 feet, Kathmar won from Gracelda, and in the class for open launches Talequah won easily from her three competitors.

FIRST DAY'S SERIES RACES, SEPT. 22, 1910

SPEED BOATS 40 FEET AND OVER—CLASS B—START 2:05—COURSE 30 NAUTICAL MILES

Boat and Owner	Elapsed Time H. M. S.	Corrected Time H. M. S.
Rapier, S. Schieffelin	Disabled	
Tartar, R. E. Slavin	1:01:12	1:01:12
X. P. D. N. C., J. Siegel	1:27:24	1:02:10



Spindrift. Owned by C. R. Butler

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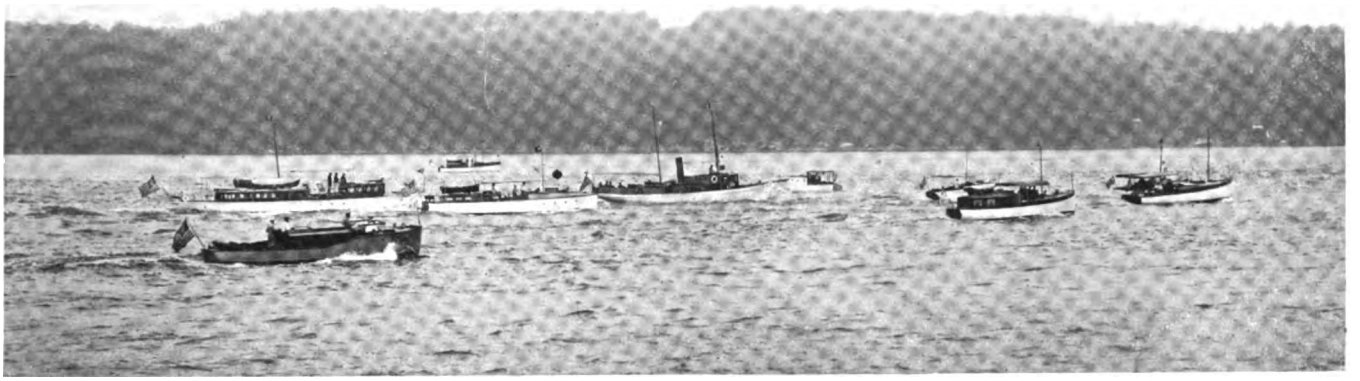

Start of the Long-Distance Race for Cruisers

SPEED BOATS UNDER 40 FEET—CLASS C—START 2:10—COURSE 30 NAUTICAL MILES

Restless, T. F. Chesbrough	1:19:35	1:19:35
Nameless, Heckscher and Melville	1:19:48	1:19:48

SPEED BOATS 30 FEET AND UNDER—CLASS A—START 2:15—COURSE 30 NAUTICAL MILES

Sand Burr, A. K. and C. D. White	Disabled	
Edith II., A. E. Smith	1:34:02	1:22:01
Peter Pan III., J. Simpson	1:32:10	1:28:34
Haida-Papoose, Max Fleischmann	1:41:34	1:32:20
Lance, Heinrich Brothers	Withdrew	
Vita, S. Blackton	Withdrew	
Vim III., G. F. Baker	1:30:07	1:30:07
Traver, A. J. Traver	Withdrew	
It, Charles Mallory	1:45:10	1:36:44

CRUISERS OVER 40 FEET—START 2:20—COURSE 20 NAUTICAL MILES

Caroline, M. F. Dennis	3:02:47	2:18:49
Avis, F. C. Havens	1:44:53	1:44:53

CRUISERS UNDER 40 FEET—CLASS E—START 2:25—COURSE 20 NAUTICAL MILES

Eronel, S. Cochrane	Disabled	
Spindrift, C. R. Butler	2:42:54	2:39:48

CRUISERS UNDER 40 FEET—CLASS F—START 2:30—COURSE 20 NAUTICAL MILES

Gracelda, D. R. Brinsmade	2:59:25	2:20:09
Kathmar, R. T. Fowler	2:13:32	2:13:32

OPEN LAUNCHES—CLASS G—START 2:35—COURSE 20 NAUTICAL MILES

Petite, B. Brown	2:35:34	2:35:34
Bunk III., C. Firth	3:01:56	2:24:32
Imp, A. Haas	3:40:57	2:58:29
Talequah, W. H. Niles	3:02:27	2:11:00

The second day of the series races provided a series of accidents which will long be remembered by the crews of the various unfortunate boats. It has often been stated that the Hudson River in the vicinity of New York is hardly the place to race high-speed boats, which statement was amply proven by the number and character of the break-downs. Nameless was the most unfortunate craft and after a collision with a submerged log, she was beached just in time to prevent sinking. Tartar, racing without a competitor, twice picked up driftwood, but was not damaged. Peter Pan bent her shaft, while Haida-Papoose, Lance and Traver also were damaged by drift. In the small speed-boat class Edith II again won. In her class but four of the eleven entries started and finished. In the other classes Avis again beat Caroline, Spindrift had a walk-over, Kathmar won over Gracelda, and Imp won in the class for open launches. Of her three competitors, however, Petite withdrew, and Bunk III and Talequah left their race to go to the

Nameless. Owned by Melville and Heckscher

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assistance of Nameless, so Imp's victory was not hard earned.

SECOND DAY'S SERIES RACES, SEPT. 23, 1910

SPEED BOATS—CLASS B—START 2:05—COURSE 30 NAUTICAL MILES

Boat and Owner	Elapsed Time H. M. S.	Corrected Time H. M. S.
Tartar, Ralph E. Slavin	1:08:54	1:08:54
X. P. D. N. C., C. F. Siegel	Did not start	
Rapier, S. Schieffelin	Did not start	

SPEED BOATS—CLASS C—START 2:10—COURSE 30 NAUTICAL MILES

Restless, T. F. Chesbrough	2:18:47	2:18:47
Nameless, Melville & Heckscher	Disabled	

SPEED BOATS—CLASS A—START 2:15—COURSE 30 NAUTICAL MILES

Edith II., A. E. Smith	1:33:39	1:21:32
Peter Pan III., James Simpson	1:30:12	1:26:44
Vanish, W. T. Reed	1:32:55	1:27:05
Vim, G. F. Baker	1:32:02	1:32:02
It, Charles Mallory	Withdrew	
Haida-Papoose, M. C. Fleischmann	Disabled	
Lance, Heinrich Bros.	Withdrew	
Traver, A. Traver	Disabled	
Gunfire II., W. J. Brainard	Did not finish	
Sand Burr, A. and C. White	Did not start	
Vita, J. S. Blackton	Did not start	

CRUISERS—CLASS D—START 2:20—COURSE 20 NAUTICAL MILES

Avis, F. C. Havens	1:51:42	1:41:42
Caroline, M. F. Dennis	2:39:07	1:55:09

CRUISERS—CLASS E—START 2:25—COURSE 20 NAUTICAL MILES

Spindrift, C. R. Butler	2:33:04	2:29:58
Eronel, S. Cochrane	Did not start	

CRUISERS—CLASS F—START 2:30—COURSE 20 NAUTICAL MILES

Kathmar, R. T. Fowler	2:07:07	2:07:07
Gracelda, D. R. Brinsmade	2:48:26	2:09:10

OPEN LAUNCHES—CLASS G—START 2:35—COURSE 20 NAUTICAL MILES

Imp, Arthur Haas	2:20:17	1:37:49
Petite, H. W. Brown	Withdrew	
Bunk III., Clement Firth	Assisted Nameless	
Talequah, M. H. Niles	Assisted Nameless	

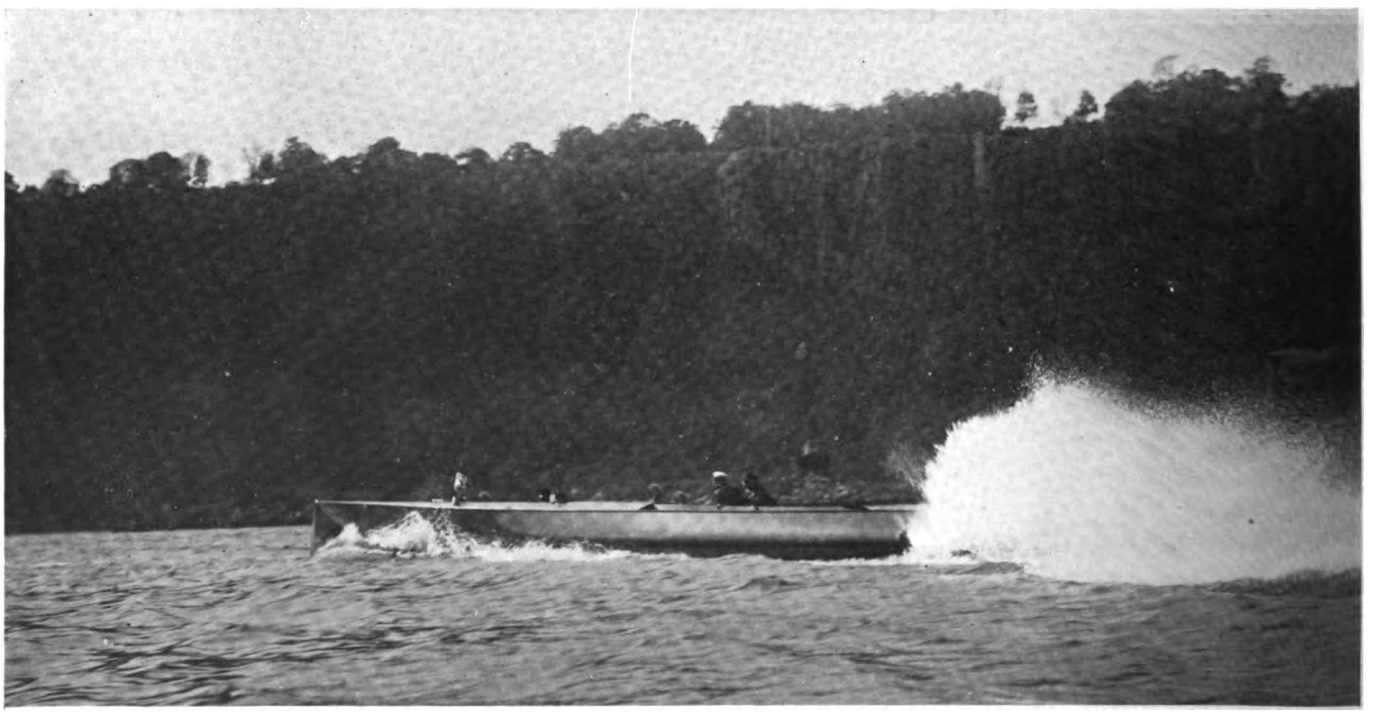
On the last day of the series, partly on account of the chapter of accidents on the day previous, practically only those craft which had accumulated sufficient points to win in their various classes showed up at the starting line. The majority of the missing, however, were pretty badly smashed up and probably could not have competed anyhow. Of the seven classes only two could boast of more than one contestant, and they each had two. In Class A, for speed boats, Vanish won from Edith, and in the class for open launches Bunk III won from Imp. The championship winners for the regatta

THIRD DAY'S SERIES RACES, SEPT. 24, 1910.

SPEED BOATS—CLASS B—START 2:05- COURSE 30 NAUTICAL MILES

Boat and Owner	Elap. Time H. M. S.	Cor. Time H. M. S.
Tartar, R. E. Slavin	1:01:34	1:01:34
CLASS C—START 2:10—COURSE 30 NAUTICAL MILES		
Restless, T. F. Chesbrough	1:39:27	1:39:27
CLASS A—START 2:15—COURSE 30 NAUTICAL MILES		
Vanish, W. T. Reed	1:29:22	1:23:32
Edith II., A. E. Smith	1:42:43	1:29:36
CLASS D—START 2:20—COURSE 20 NAUTICAL MILES		
Avis, F. C. Havens	4:05:31	4:05:31
CLASS E—START 2:25—COURSE 20 NAUTICAL MILES		
Spindrift, C. R. Butler	4:13:48	4:13:48
CLASS F—START 2:30—COURSE 20 NAUTICAL MILES		
Kathmar, R. T. Fowler	4:33:15	4:33:15
CLASS E—START 2:35—COURSE 20 NAUTICAL MILES		
Bunk III., C. Firth	2:49:28	2:49:28
Imp, A. Haas	2:59:11	2:54:07

being as follows: Tartar, owned by Ralph E. Slavin, won the National Trophy, for speed boats over 60 feet; Restless, owned by T. F. Chesbrough, won the International Trophy; Edith II, owned by A. E. Smith, won the Inter-State Trophy; Avis, owned by F. C. Havens, won the Motor Yacht Trophy; Spindrift, owned by C. R. Butler, won the Cabin Launch Championship; and the two special prizes, one for cabin boats under 40 feet and one for open boats, were won respectively by Kathmar, owned by R. T. Fowler, and Imp, owned by A. Haas.



Tartar, Owned by R. E. Slavin, Taking a Turn at Full Speed

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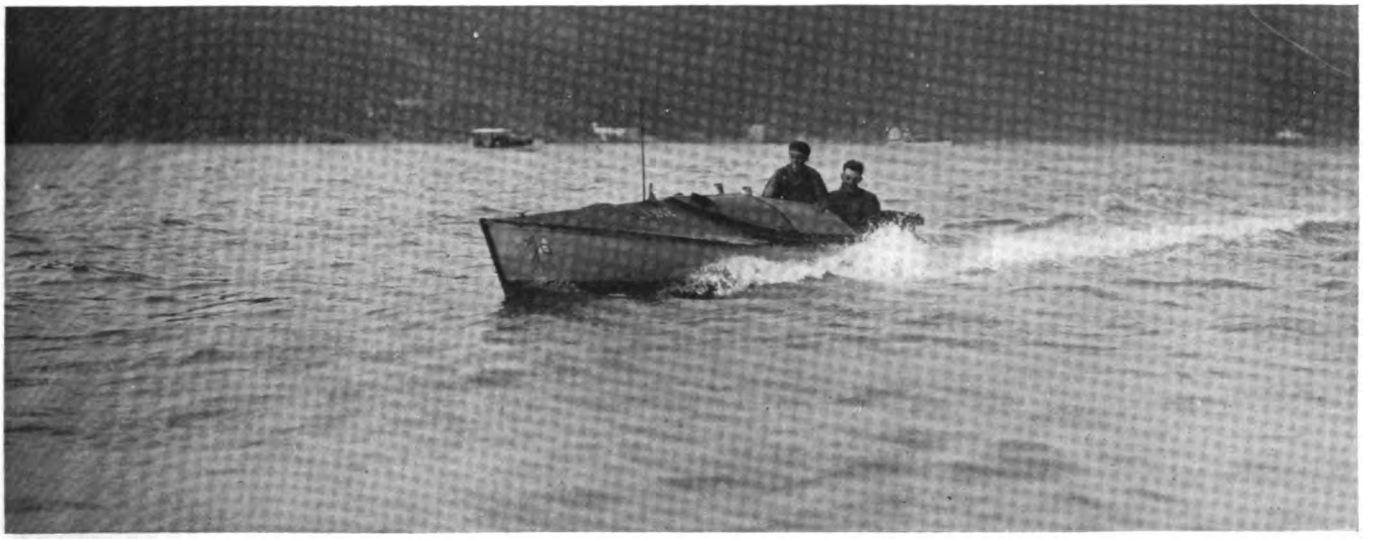
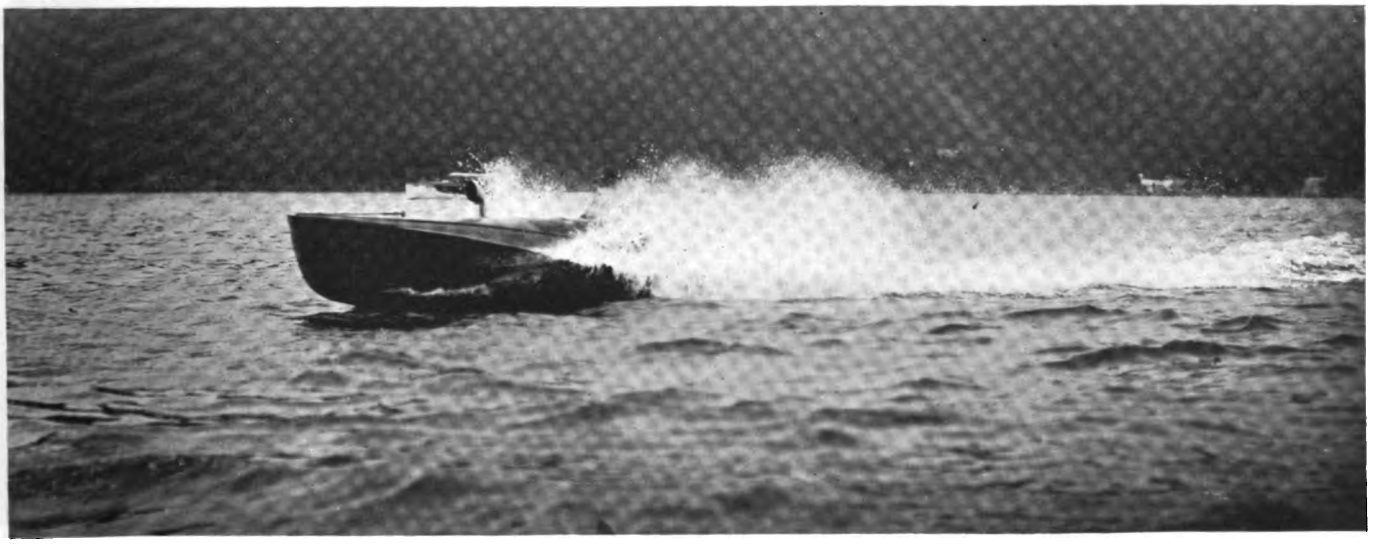
Peter Pan III. Owned by J. Simpson



Lance. Owned by Heinrich Brothers



Vim. Owned by George F. Baker

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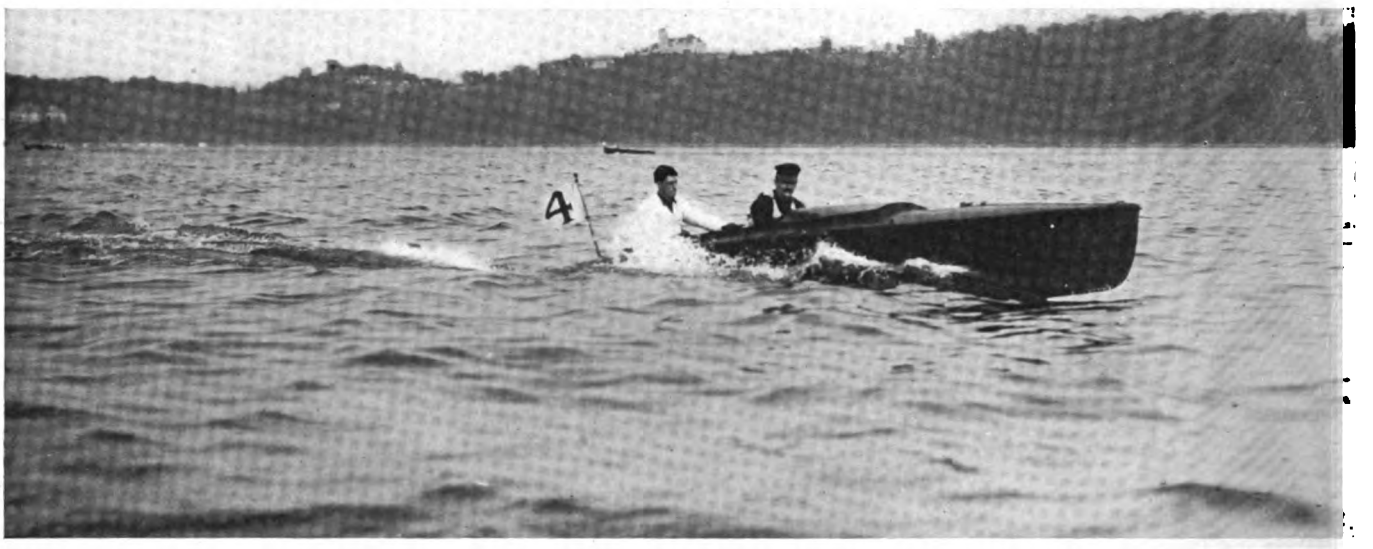
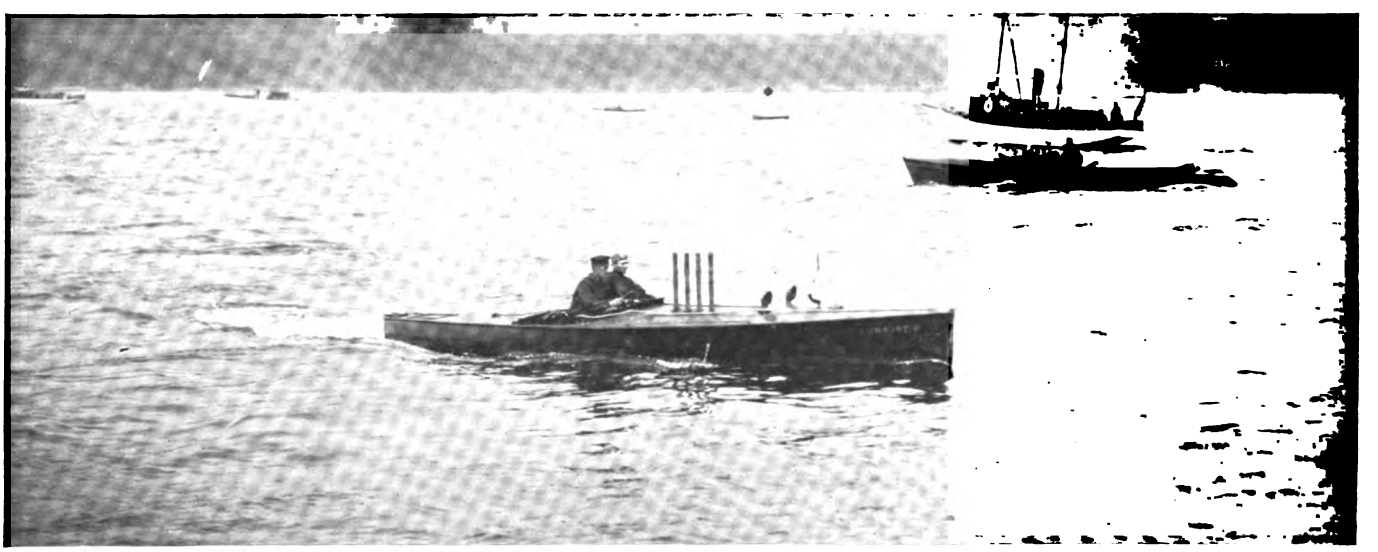


Petite. Owned by H. W. Brown

Sand Burr. Owned by A. and C. White



Gunfire II. Owned by W. J. Brainard

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Restless. Owned by Thomas F. Chesbrough

Traver. Owned by A. Traver

XPDNC Owned by J. Siegel

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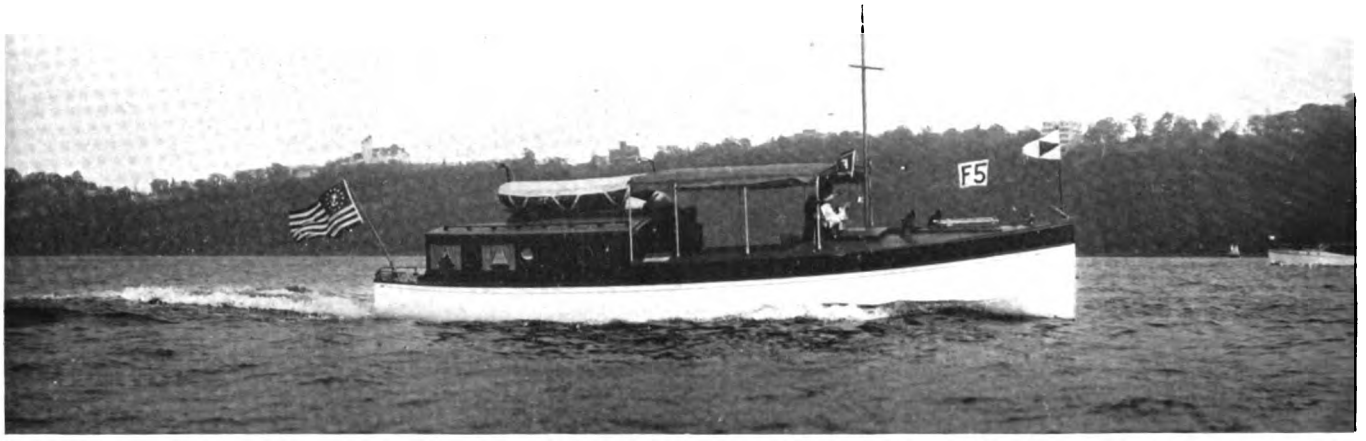
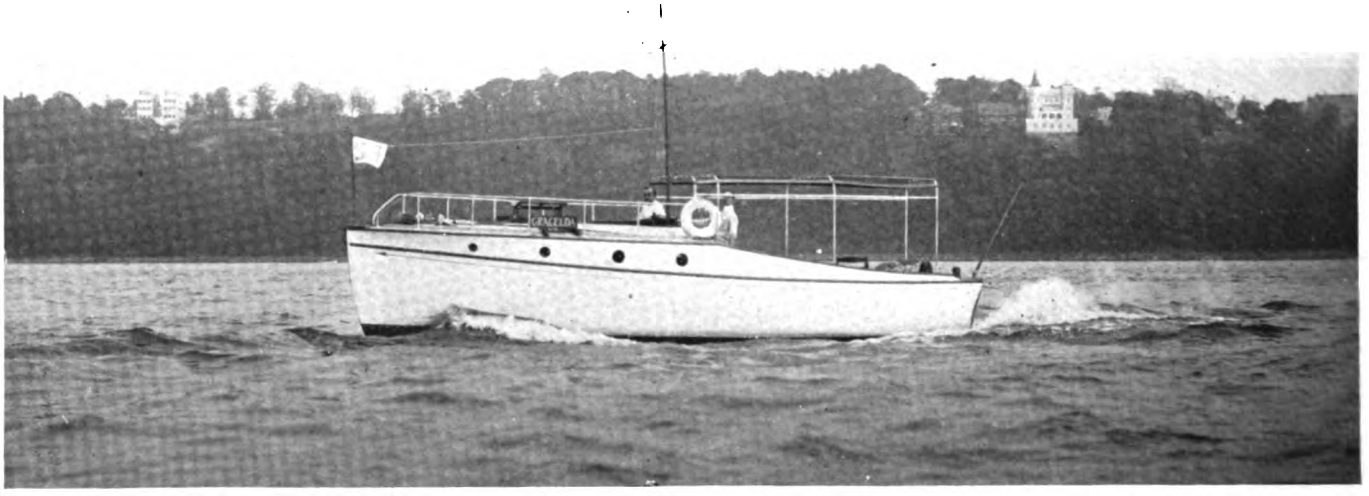


Kathmar. Owned by Robert T. Fowler



Gracelda. Owned by D. R. Brinsmade

Quadrant II. Owned by A. P. Lundin

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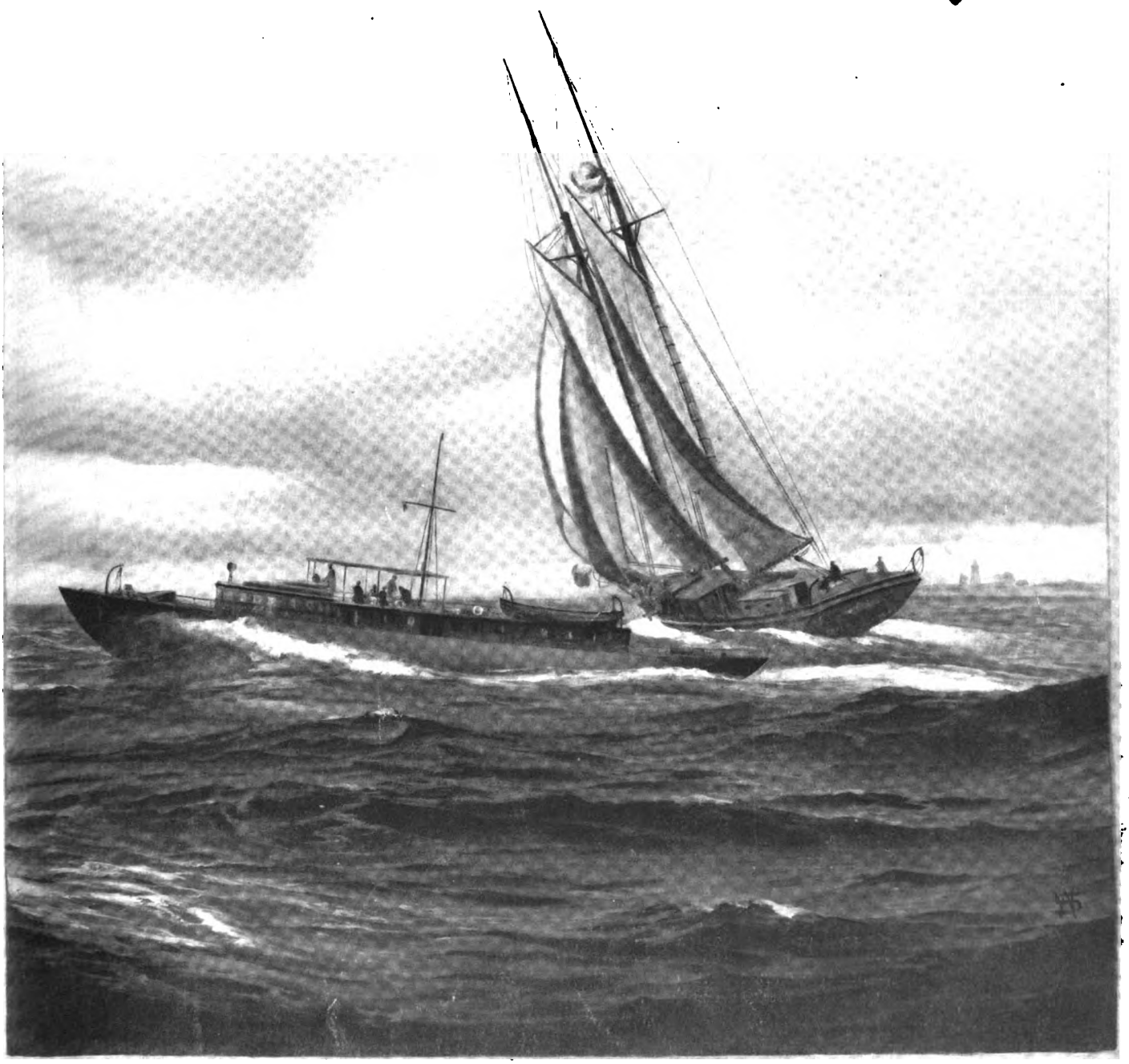

NOVEMBER, 1910

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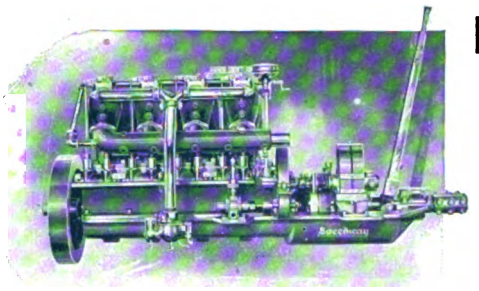
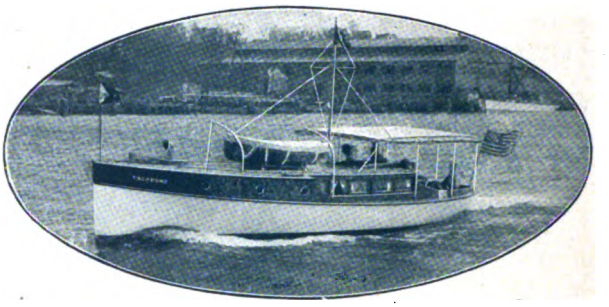
SPEEDWAY



Launches and Engines are the Best



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A lot of people want the BEST, are willing to pay for the BEST, but where to get it is the question.
If in doubt, go to Seabury's.
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It is simpler to many to make poor goods at low prices than for few to make good goods at high cost.
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Corona, N. Y.,
November 2d, 1909

Lamb Engine Co. of New York,
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As you know, I have no hands or arms, and operate the boat and motor with my feet. As far as the running of the motor is concerned, I may just as well have been without my feet, as it invariably started on the switch after lying idle over night, and there was nothing to do but to keep sufficient oil and gasolene in tanks.

The best I can say is, "That I believe the 'Lamb' is by far the best of all marine motors, and when used by people with hands and arms it will never be out of commission."

With best wishes, I beg to remain,
Yours very truly,
CLARE A. LUTZ.

The illustration shows Mr. Lutz, a Lamb engine enthusiast, who has recently made a 2,000-mile trip with a 12-H.P. Lamb engine, and being unfortunate in not having hands or arms was able to take down his Lamb engine without aid owing to its accessibility.

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The Rudder

Edited by THOMAS FLEMING DAY

Vol. XXIV NOVEMBER, 1910 No. 5

BERMUDA

Hollis Burgess

THAT charming little group of islands known as Bermuda is becoming better known every year throughout the United States, but there is still a surprising ignorance among many Americans as to the character and location of this ocean paradise. Reports of the roughness of the voyage to Bermuda have doubtless misled many people into thinking it is some far-off country and deterred them from making what they look on as a long ocean trip. As a matter of fact, however, Bermuda is only six hundred and sixty-six miles from New York, and as the average time for the trip is only about forty-four hours, those who suffer from seasickness do not have to endure their discomfort long, and the writer can assure those who are in search of either health or pleasure that it is worth all the pangs of seasickness to reach the "Land of the Lily and the Rose."

The climate of Bermuda is known to be the most equable in the world, the warm waters of the Gulf Stream forming an effective barrier to the frost and snow of the North and equalizing the temperature all the year round to a surprising extent. The average Winter temperature is 60 to 70° and the average Summer temperature 70 to 80°, while the lowest temperature ever recorded is 45° and the highest 90°. Being a group of islands without mountains and almost six hundred miles from the nearest land, Cape Hatteras, Bermuda has an oceanic climate with frequent changes of wind constantly counterbalancing the effects of the humidity or moisture in the air. In Winter high winds are frequent but with hills and valleys, cedar trees and hedges of oleander and tamarisk for protection, little damage is done even in the most violent gales, while the West Indian hurricanes usually pass to the westward of Bermuda.

There is no regular rainy season in Bermuda and while rain-squalls are a common occurrence in Winter, they do not last long. It often rains here in the most nonchalant manner, sometimes a shower actually falling on one side of the street and not on the other. One minute the sun may be shining brightly and before you know it the sky clouds over and a shower is falling, but it soon passes away, and the porous coral rock soaks up the rain-water so rapidly that the roads are never muddy. As there are no streams or wells of fresh water on the islands, rain is absolutely essential for the water supply and every house has its stone water tank. These water tanks are required by law to be provided with a means of conducting water from the roofs of the houses, which are made of thin slabs of coral rock whitewashed at frequent intervals, so that the water is thus bound to be absolutely pure.

One of the most striking characteristics of Bermuda, which is noticed at once by every one who lands there for the first time, is the exhilarating freshness of the air. The balmy atmosphere fills the lungs with an invigorating spirit, giving the nerve-racked city dweller of the North a remarkable feeling of buoyancy and vitality. In this land where frost is never seen, where the sleep-giving, health-bringing breezes combine with the panoramic beauty of sea and land to please the senses, life in the open air is at its best. As a health resort, especially in Winter, Bermuda is unsurpassed, except for consumptives, whom the moisture of the atmosphere unfavorably affects.

Outdoor recreation is a feature of life in Bermuda. Yachting, fishing, driving, bicycling, golf, tennis, baseball, cricket and football are popular pastimes indulged in at all times of the year. Like all English colonies, Bermuda is a sport-loving country and the officers and men of the troops stationed here take part in the different sports. Almost every day a football, cricket or golf match is played on the garrison grounds, and many of

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the officers are expert yachtsmen. Automobiles are not allowed on the islands, a law having been passed forbidding their use. They were tried there once for a short time but the narrow winding roads proved unsuitable for them. As Bermuda contains only nineteen square miles and is only twenty-five miles long, they are certainly not needed, and will take away considerably from the quaintness and peace of the islands if they are ever allowed there again. For bathers there is some splendid surf bathing and also many sheltered inlets and quiet bays where one can enjoy the delightfully warm water. Fishing is very fine, the waters teeming with fish of many species, including the grouper or hamlet, weighing from 30 to 50 pounds.

The writer has been yachting in many places but has never seen a more ideal spot than the Bermuda islands for this greatest of all sports. Here there is no long Winter season when yachts are laid up in dreary sheds or under canvas covers, for the Bermuda yachts remain in commission the whole year. In the last few years ocean races for sailing yachts and power boats from the United States to Bermuda have become very popular.

A few of the American yachts now owned in Bermuda are Isolt, formerly Mineola, and Chispa, both Edward Burgess designed yachts; Dorothy Q, Achilles, Trouble, and Joyeuse ex-Irene II. The typical Bermuda yacht has a tall polemast raking way aft with a leg-of-mutton sail and no gaff, with the foot of the sail stretched either on a boom or a sprit. She has a long bowsprit with a large loose-footed jib, and is usually deep and heavily ballasted. Built of the native red cedar and while racing often carrying a jib-topsail or an extra jib-boom, the Bermuda yachts present a very rakish appearance. Their rig makes them easy to handle, but they cannot compare in speed with a typical American yacht. Zena, the only regular native boat that has ever entered one of the Bermuda ocean races, is a handsome yacht, very staunch and able, but lacks the speed of the modern racer with an ordinary gaff mainsail. Most of the native yachts are used for party or fishing boats as well as for pleasure, and yachtsmen visiting Bermuda who do not bring their own yachts with them can hire these boats for racing if they so desire.

The regular racing season in Bermuda begins about January 1st and ends about May 1st, though races are often held in Summer as well. The Royal Bermuda Y. C., the Hamilton Dinghy Club and the St. Georges Y. C., are the leading yacht clubs. They have attractive clubhouses, with restaurants, sleeping rooms, billiard rooms and so on. Some interesting and valuable paintings of old American and English yachts may be seen in these clubhouses and visiting yachtsmen are always cordially welcomed here. During the regular season a regatta is sailed almost every Thursday off the Princess Hotel, a splendid view of the race being had from its broad verandas. The Bermuda dinghys with their large sails afford splendid sport and a dinghy race is a picturesque sight as the little boats, with their crews of four or five men wearing brilliant striped jerseys and gaily colored racing caps, tear along in a smother of foam. Yachts from all over the world often stop in either Hamilton or St. Georges Harbors.

To the student of Nature Bermuda always proves an unfailing source of interest. The islands themselves are built upon a submarine mountain and their proximity to the warm waters of the Gulf Stream accounts for

Steamer Bermudian Entering Hamilton Harbor, Bermuda

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their coral formation. There are said to be three hundred and sixty-five islands in the group, but the five principal ones, connected by bridges and a causeway, are St. Davids Island, St. Georges, Bermuda or Long Island, Somerset and Ireland. The general outline of the islands is in the form of a shepherd's crook or a crescent, and they lie to the south of a line of coral reefs or atoll which extends for several miles and acts as a natural breakwater for the heavy seas rolling in from the broad Atlantic. Between these reefs and the islands is a narrow winding channel which is the only means of approach from the ocean.

The islands are honeycombed with caves and these wonderful productions of Nature are among the most interesting places to be seen in Bermuda. The best known caves are Joyce's Dock Cave, Crystal Cave, The Admiral's or Edinburgh Cave and Walsingham Caves. Joyce's Dock Cave, consisting of two separate caverns, is of particular interest as it is believed to be the cave mentioned by Shakespeare in his play "The Tempest." It is known that Shakespeare had a knowledge of Bermuda, as he speaks of "the still vexed Bermoothes" in "The Tempest," and it is generally supposed that the description of Prospero's Cave was drawn from what he was told of this Bermuda cave. It has a lake in the center, and the reflection of hundreds of glittering stalactites and stalagmites in its clear waters by the light of the acetylene gas with which the cave is illuminated, is very beautiful. Many of the stalagmites resemble various figures and one group has been named the "Garden of the Gods"; figures resembling a bust of Shakespeare, a Santa Claus head and many others being seen here.

The Crystal Cave is the largest of the Bermuda caves and is a hundred and fifty feet below the surface of the earth. This cave also contains a lake fed by some subterranean passage from the ocean, known as Cahow Lake, so named because the fossilized form of an extinct bird, the cahow, was found here. The entire roof is covered with beautiful stalactites of various colors formed by the water percolating through the limestone and hardening when it strikes the air. One descends to the bottom of this cave by a series of easy steps and the temperature at the lowest level is about 80°. A string of wooden pontoon bridges crosses the center of the lake and the visitor can look from them far down those wonderfully clear waters in which the fantastic shapes of stalactites and stalagmites cast their weird reflections. Down here below the surface of the earth one seems to be in a veritable fairyland and the peaceful calmness of the cave, with its warm moist air and beautiful placid lake, gives one an indescribable feeling of quiet contentment. The Crystal Cave was only discovered a year or so ago and in the following manner: Two little negro boys were playing in a garden when one of them suddenly fell down a short distance through a small hole. Squeezing his way along he soon espied this great chasm yawning before him and hastily retraced his way to the open air above to announce his find. The cave became the property of the man who owned the land on which it was found, but it is pleasing to note that the boys received a handsome present for their valuable discovery and that every Christmas they are presented with a substantial gift by the owner of the cave.

These caves are a source of considerable profit to their owners, as two shillings admission is charged, and almost every visitor to Bermuda enters them at least once. There is no doubt but that many other caves still remain undiscovered, the dull rumble which one often notices in some parts of the islands whenever a heavy cart passes along, unquestionably indicating the presence of some cavern or grotto below. In fact, a new cave was discovered in 1909, the largest yet found on the islands, which will be opened to the public shortly, and which is said to even surpass the others in beauty and charm.

The Devil's Hole, or Neptune's Grotto, is an extremely interesting natural open grotto which has been transformed into an aquarium and stocked with native fish. Over two thousand fish of many different species may be seen here. Beautiful angel fish, parrot fish, red snappers, mullet, rockfish, groupers or hamlets, and turbot are a few of the different kinds of fish here, as well as some turtles and crabs and a few Bermudian lobsters, which appear strange at first to the visitor from the North, as they have long feelers instead of the claws of the American lobster. An old native is in charge of this aquarium, who delights in describing the different characteristics of the fish to the visitor. To disprove the theory that fish cannot hear he taps with a stick to call them to be fed and the instant he strikes the rocks the fish make a dash towards him and with mouths wide open and staring eyes wait eagerly for the food he throws them. The mouths of the groupers are so large that they sometimes measure nine inches across and very interesting it is to see several hundred groupers with their big red mouths open lined up to catch food. Some of these Bermudian fish change their color at will, sometimes appearing light and at other times dark, or oftentimes even changing colors in different parts of their bodies. It is said that the name Devil's Hole was originally given to this grotto because of weird sounds which used to come from the back part of it where a subterranean passage leads for some distance under the rocks. It is understood now, however, that these sounds are produced by some of the fish who make a groaning noise occasionally, the echoes of which reverberating under the rocks often startle those unaccustomed to it.

Bermuda is a marvelously beautiful land. The clear blue waters, the exquisite coloring of sea and sky, the ever green foliage and gorgeous flowers and the dazzling white houses and roads all blend to make a lovely picture. Alluring paths lead through groves of tropical vegetation from which views of the blue Atlantic with dainty green islands and peaceful little harbors appear here and there to the passerby. The roads are very fine, the Government spending large sums of money every year in their maintenance and improvement. They are hard and smooth and white as snow and in many places the grades on the steep hills have been reduced by cutting passes through the coral rock. Horses and carriages and bicycles are the universal means of travel and the drives of Bermuda are said to be unsurpassed anywhere in the world. Along the roads are stone walls covered with life plants, ferns and creepers of all kinds, and as one drives by in the fine rubber-tired carriages with the splendid horses which the Bermuda livery stables all furnish, beautiful little white villas with bright green shutters over the windows surrounded by tropical gardens and handsome trees, are seen on every hand. The natives are uniformly courteous and always have a welcoming smile or a pleasant word of greeting for the visitor.

There is an endless growth of cedar trees, palmettos royal palms, cocoanut, date and sago palms, rubber trees and century plants. Then there is the mahogany tree,

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the gru-gru palm, the screw palm, the pau-pau tree, the cactus of several different species, the tamarisk, locally known as the spruce, the poinciana, a tall striking tree with wide-spreading branches, the mangrove tree and the pomegranate, partly a shrub and partly a tree with large crimson blossoms. The passion flower, the night-blooming cereus, the white and yellow jessamine, the morning glory, the scarlet and rose geranium, the Spanish bayonet with its large bunch of white flowers, the dog bush with its deep green foliage, the poinsettia, a handsome shrub with greenish and red flowers, and the hibiscus, another gorgeous shrub, are found in great abundance. One of the most noticeable plants on the islands which is found growing everywhere is the life plant with its large fleshy leaves and pendulous flowers of green and purple. A single leaf pinned to the wall in a house will throw off young shoots and no matter how you may crush it in your hands it will still continue to live. The fiddlewood tree, the tamarind, a large tree with light green leaves and wide-spreading branches, and the calabash tree grow in many places. The fruit of the calabash tree is shaped like a football and when ripe is hollow like a gourd, and its shell is much used for boat bailers, baskets, and other purposes. The prickly pear grows luxuriantly in the most barren places, and the loquat, a native tree of Japan bearing a delicious yellow fruit similar to a small plum, is carefully cultivated. In sheltered places a few bamboo canes are found growing to a height of thirty or forty feet.

The best known flowers on the islands are the lily, the oleander and the rose. The Bermuda lily is known all over the world and has attained considerable commercial importance, thousands of lily bulbs being now exported every year. A field of Bermuda lilies in full bloom in the Spring is one of the most beautiful sights imaginable and many tourists plan their trips to the islands with the intention of seeing these delightful remembrances of Easter-time growing in their native place. The oleander bushes, sometimes fifteen to twenty feet high, are covered from early Spring until December with white, pink and scarlet blossoms. They are seen everywhere and are much used as hedges and wind shelters on account of their thick foliage. Roses of every color and variety flourish throughout the islands.

Potatoes, onions and arrowroot are shipped in large quantities from Bermuda and have much commercial value. The Bermuda potatoes are famous for their mealiness, whiteness and delicious flavor and are much relished by Americans. Fields of onions catch the visitor's eye everywhere and thousands of crates of onions are shipped away every year. Arrowroot, a plant with large spear-head-shaped leaves and enlarged underground roots, thrives in the rich Bermudian soil. A starch is made from its roots which when cooked makes a nourishing food for invalids. Banana, orange and lemon trees are also found here, the Bermuda banana though very small having a delicious flavor.

Wherever one may wander about the islands birds of many varieties will be found. The most conspicuous of all is the redbird or cardinal bird, whose bright scarlet plumage attracts much attention and whose charming notes constantly please the visitor's ear. Bluebirds are very numerous while the common English sparrow and warblers of every kind abound. Pretty little ground doves with gray plumage and pink feet walk quietly about, blackbirds hop around among the trees, and hum-

Government Dockyard on Ireland Island, Bermuda

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ming birds, quail, partridges, catbirds, goldfinch and ricebirds are often seen. Kingfishers, cranes, herons and tropic birds with their peculiar long tails frequent the seashore and harbors.

The most interesting of all the numerous attractions that Bermuda has to offer, in the writer's opinion, are the wonderful sea-gardens situated in Grassy Bay off the entrance to Hamilton Harbor. Excursion steamers run by the "Island Steam Service" take visitors out to the coral reefs where these gardens lie and disembark them into large rowboats with panes of thick glass in their bottoms, through which one can gaze down into the clear blue water at the wonders below. Beautiful lilac-colored wavy sea fans, pearl oysters, finger sponges, sea rods, rose coral, brain coral and exquisite sea mosses and sea anemones are seen here in all their perfection. Looking at these marine gardens seems like a glimpse into fairyland and those who have once seen them never forget them. To enhance the beauty of all these plant formations, fishes of various species, including the beautifully tinted angel fish, dart hither and thither. On the way back from the reefs the steamers usually stop at the Aquarium on Agars Island where what was originally a powder magazine has been cleverly transformed into an aquarium with tanks stocked with native fish of every description.

The history of Bermuda is extremely interesting. The year 1515 is generally considered as the date of the discovery of Bermuda, although it is probable that there was some knowledge of the existence of the islands before that date. Juan de Bermudez, the discoverer, was a Spaniard, and though he did not land on the islands, he carried back such favorable reports of the new country to Spain that in 1527, T. Ferdinando Camelo, a native of the Azores, was given a grant of the Bermuda islands by King Philip II of Spain. It is supposed that Camelo first visited the islands in 1543, as a monogram with a cross and that date was cut in a rock, now known as Spanish Rock, on the South Shore seventy feet above sea level. History records that early mariners were afraid of the stormy Bermudas and believed them to be inhabited by devils. In 1593 an Englishman named Henry May was wrecked in a French vessel on the northern reefs and lived on the islands for about five months, during which he built a boat and afterwards sailed to Newfoundland.

But 1609 may be considered as the real beginning of the history of Bermuda, for in that year Admiral Sir George Somers on his ship Sea Adventure, bound from Plymouth, England, to the new Colony of Virginia, was blown out of his course by a storm and wrecked on the reef off St. Georges Island, now known as "Sea Venture Flat." The shipwrecked mariners remained on the islands for ten months and built two vessels, Deliverance and Patience, on which they finally sailed in safety to Virginia in time to save the lives of many of the famine-stricken settlers of the Jamestown Colony with the large supply of provisions which they brought with them from Bermuda.

After a month's stay at Jamestown, Sir George Somers and his men set sail for Bermuda again to bring back more supplies. They had a hard voyage and Sir George Somers died soon after his return to the islands, some historians say from the strain of his two severe voyages and others from eating too much roast pig, the islands being overrun at this time by hogs which had been left there originally by Spaniards or buccaneers. Sir George Somers' last instructions were for his party to return to Virginia with provisions for his famine-stricken countrymen; but his followers did not carry out his orders as they returned to England with his body. His heart was buried at St. Georges, and in the St. Georges public gardens the visitor may find a memorial tablet to the Admiral with an inscription stating that his heart was buried near this spot.

Much interest was now aroused in England about the islands, reports of the great productiveness of their soil and rumors of buried treasure left here by shipwrecked Spaniards at different times creating considerable excitement. In 1612, The Virginia Company formed a sub-company and sent out Richard Moore and fifty others as settlers. A year later the main company sold all its rights to the islands to The Bermuda Company, which in 1615 was granted a charter by King James I. In 1615 after many dissensions The Bermuda Company was dissolved and two years later the Crown sent out Sir Robert Robinson as Governor and the colony soon became a flourishing community. During the American Revolution Bermuda was seriously affected by the cutting off of its principal source of food supplies and the stoppage of its commerce. The colonists sympathized with the Americans and materially aided General Washington by breaking into the public powder magazine and removing a hundred barrels of gunpowder which were afterwards used by him in the Battle of Bunker Hill.

The government of Bermuda is in the hands of a Governor appointed by the Crown, an Executive Council which acts as an advisory body to the Governor, a Legislative Council and a House of Assembly. The Executive Council consists of the Senior Military Officer in Bermuda, the Colonial Secretary, the Attorney-General, the Receiver-General and two others. The Legislative Council consists of the Chief Justice, the Colonial Secretary, the Receiver-General and five others. The House of Assembly consists of thirty-six members, four to represent each of nine parishes, who must be property owners to be eligible to hold a seat. Because of its naval and military importance the Governor of Bermuda is always a General of the Royal Artillery or Engineers, the present Governor being Walter Kitchener, a brother of the famous Lord Kitchener of Khartoum.

Bermuda is divided into nine parishes instead of into counties or townships. Beginning at the eastern end of the islands St. Georges Parish comes first. Then in order come Hamilton Parish, Smith's, Devonshire, Pembroke, Paget, Warwick, Southampton and Sandy's, the extreme western parish. Each parish has two churches, two post-offices, schools and stores, with magistrates and parish and church vestries. The population of Bermuda, which is about fifteen thousand in all, is largely made up of negroes and education is compulsory for colored people as well as white, the schools for colored children and white being entirely separate. Many of the negroes speak French fluently and have a knowledge of Latin, while almost all of them speak with a decidedly English accent, which seems strange at first to those who visit the islands for the first time. In the will of Cecil Rhodes provision was especially made to encourage students educated in Bermuda to visit educational institutions abroad in order to compete for the annual Rhodes' Scholarship. Besides many Episcopal churches, there are eleven Wesleyan Methodist churches, two Presbyterian churches, one Roman Catholic church with a convent and school, and eight African Methodist Episcopal churches. The Salvation Army is very active in Bermuda, having four meeting places and holding

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street parades every night, which appeal particularly to the negroes.

Bermuda is very strongly fortified and no other British possession, with the exception of Gibraltar, is so carefully guarded by England. About two thousand British soldiers are always stationed on the islands, the garrison being divided into three camps. Prospect Camp, in the center of the islands, is the military headquarters where the Infantry and Royal Engineers have their main barracks. In St. Georges, at the eastern end of the islands, are the principal forts and the barracks of the Royal Artillery, while on Ireland Island, the western end of the islands, is located the Dockyard, the naval station of Bermuda. Here is moored the largest floating dry-dock in the world with the exception of the Dewey which is capable of lifting a vessel of over seventeen thousand tons displacement. As Bermuda is an important English coaling station, there is almost always a battleship or two anchored off the Dockyard and busy little navy tugs are constantly plying to and fro. Since Sir John Fisher has been Lord of the British Admiralty the naval forces of Bermuda have been materially reduced, but even now many sailors are seen around the Dockyard and immense supplies of ammunition and war materials of every description are stored here. As the islands are surrounded by dangerous coral reefs and sunken rocks as well as fortified by towers, forts, batteries and an extensive system of torpedoes, they are practically impregnable.

The principal town and capital city of Bermuda is Hamilton in Pembroke Parish, the seat of government having been removed here from St. Georges, the former capital and only other town on the islands, in 1815. Hamilton has a population of over twenty-five hundred and was changed from a town to a city in the year 1897, to commemorate Queen Victoria's Diamond Jubilee and the centennial of its incorporation. It is a handsome, well arranged city, with broad white coral streets running parallel and at right angles to each other. It is the principal port of entry in Bermuda and all the regular steamship lines run here. On "steamer day," when one of the regular passenger steamers arrives, the docks along the water-front are lined with people, both white and colored, anxious to greet the visitor with a hearty welcome, and also possibly to get a little of his money, as catering to the wants of the tourist is one of the principal occupations of Hamilton. Front Street, which runs along the water-front back of the docks, as well as Reid, Church and Victoria streets which run parallel to it, and Queen, Burnaby, Parliament, Court and King streets running at right angles, are lined with modern stores stocked with American, English, Canadian and Continental goods. Clothing materials, millinery, jewelry and souvenir stores are particularly fine in Hamilton and there are several good modern American drug stores, tailor shops, bicycle shops and hardware stores. The Hamilton photographic shops are excellent, the bright sunlight and clear air of Bermuda being well suited to cameras. The shop of N. E. Lusher & Sun, on Queen Street, whose pictures illustrate these pages, has on sale some of the finest photographs the writer has ever seen. Americans are welcomed with particular cordiality in Hamilton, the American dollar winning as much respect here as in most other countries on the globe, and although English money is, of course, the standard Bermudian coin, American currency is freely accepted everywhere.

Lily Field in Full Bloom

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Nearly all goods coming into Hamilton or anywhere else on the islands are subject to an ad valorem duty of from five to ten per cent., passengers' baggage and professional apparatus being exempt. There is a specific duty of five shillings charged on bicycles and twenty shillings on horses.

The Cathedral is one of the most conspicuous buildings in Hamilton. It is a handsome stone structure with a large square church tower, and the regular Church of England services are held here. On Front Street there is a block of buildings, known as the "Public Buildings," which includes the offices of the Governor, Colonial Secretary and Receiver-General, also the Council Chamber, Custom House and Public Library. Nearby is the Colonial Post-Office and the Sessions House, where the House of Assembly and the Supreme Court hold their Sessions. A notable feature of the latter building is the handsome clock tower which was added a few years ago to commemorate Queen Victoria's 1887 Jubilee.

The Governor's large and imposing mansion, known as Government House, where many delightful functions are held, is situated on a hill called Mount Langton, just back of Hamilton, and is surrounded by trees and handsome tropical gardens. Prospect Camp is about a mile to the northeast of Hamilton and on Sunday mornings and holidays many visitors come out to see the inspection drill and church parade which is held here on the parade ground just before services in the garrison chapel. The English soldiers, wearing scarlet uniforms and white pith helmets adorned with scarlet hatbands, their breasts often glittering with medals, and with silver shoulder emblems and broad white belts, present a most spectacular appearance at this drill. The Duke of Cornwall's Light Infantry was the regiment stationed here when the writer saw the parade and it would be hard to find a finer body of soldiers than these men. Many of them were Boer War veterans and several had seen service in other campaigns. The sergeants, tall men of striking appearance, went in and out among the lines of soldiers while they stood at attention, and examined the men's uniforms and accoutrements with the greatest care. The roll call was called, buglers played, and the columns wheeled in different maneuvers at the sharp orders of the officers. After the drill was over the soldiers marched to the little chapel, which as well as the barracks, stands beside the parade ground. The colonel of the regiment and two or three of the chief officers did not take part in this parade but entered the chapel with their wives a few minutes before the others. After the services were over the regimental band played on the green near the mess, bringing the ceremonies to a delightful close.

An interesting sight in Hamilton is Cedar Avenue, a broad street lined on both sides with rows of lofty cedar trees, which runs beside the Hotel Hamilton and makes a beautiful arched passage to drive or walk through. Near here also is Victoria Park, a tiny little public park, laid out with beautiful tropical gardens with a bandstand in the middle where band concerts are often given. It is delightful to sit here and rest a while, breathing in the soft Bermuda air and enjoying the peaceful stillness that pervades, with the scent of beautiful flowers and the song of birds to please the senses, and all thoughts of the toil and bustle of everyday life in the North forgotten for the moment. The Par-la-Ville gardens on Queen Street are also attractive, this being a park where the trees and plants are allowed to grow wild, thus giving the visitor an opportunity to judge of the great productiveness and natural fertility of the Bermuda soil. The Natural History Museum is in these gardens which though small has an interesting collection of native plants, fishes, birds and the like. In front of this museum stands a gigantic rubber tree, the largest on the islands, whose large trunk, wide-spreading branches and big leaves always attract much attention.

There are many beautiful villas in Hamilton surrounded by tropical gardens of great luxuriance and the whole city has a prosperous and well-kept appearance. The houses here, as in all the other parts of the islands, are made of native coral stone, whitewashed two or three times a year so that they always look clean and white. The building stone is sawed from quarries in large square blocks, the coral rock being soft enough at first to admit of saw-cutting but hardening on exposure to the air. Most of the villas have names marked on the front gates of their gardens, as house numbers are not used on the islands. English soldiers are seen on the streets everywhere and very smart they look with their scarlet or khaki uniforms, each one carrying a little silver-headed cane, the purpose of which, it is said, is to make them keep their hands out of their pockets.

There are two public halls in Hamilton, the Mechanics' Hall and the Colonial Opera House. The former is especially used now for moving picture shows though concerts, theatricals, minstrels and other performances are frequently held here. At the time the writer was here, the moving picture entertainments were conducted by a French Countess and her son, the Countess and Vicomte d'Hanterives. The pictures themselves were not as good as those seen in American cities, the films being rather indistinct and the light uncertain, but the audience was very interesting. On the floor the audience was chiefly made up of soldiers who stamped, whistled and sang whenever they felt like it and who seemed to enjoy the pictures extremely. Whenever the English flag was thrown on the screen, they applauded vociferously, while the few Americans in the audience, not to be outdone, cheered lustily whenever the Stars and Stripes made their appearance. The balcony was given up to colored people, who enjoyed the pictures better than any one else, talking and laughing heartily all the way through. One remarkable thing was that they would laugh at the most pathetic scenes in the pictures, apparently not making any distinction at all between gay and sad events. The Colonial Opera House, which is the larger of the two halls, has many good plays during the season and is a much more pretentious place, with a large stage and seating capacity for about a thousand people. The regular theatrical season of 1910 was opened here by a New York dramatic company, with Governor Walter Kitchener and his staff seated in the audience dressed in resplendent uniforms, while the late Mark Twain pressed the button that gave the signal for the play to begin. Mark Twain was very fond of Bermuda, spending a great deal of his time there and the famous white suit with which the humorist sometimes startled New York, when he appeared on the streets in it, smoking the inevitable cigar, was undoubtedly a Bermuda production. In the Garrison Theatre at Fort Prospect plays are occasionally given which are particularly interesting on account of their military atmosphere.

One feature of Hamilton which is also true to an even greater degree of all other parts of the islands, is its extreme quietness at night. The absence of street cars and automobiles is largely responsible for this, but even so it seems strange at first. There is something

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about the soft tropical night of Bermuda which spreads an air of peace over the islands, and it is delightful to the visitor from the North to just sit out in the open air, gazing at the brilliant starlight sky and the peaceful scenes around him, losing some of that feverish, restless energy which so characterizes Americans. Few people are seen on the streets after dark and the natives on the whole are a very home-loving people. The street lamps are of the old-fashioned kerosene oil type at the present time although an electric street lighting system will doubtless soon be installed. The hotels have electric light plants of their own. Night in Bermuda is usually well lighted by the stars which shine with great brilliancy in this semi-tropical zone.

The approach to Hamilton Harbor is very picturesque. The channel begins off St. Georges at Five Fathom Hole, where the local pilots are taken aboard, and winds along between the northern shore of the islands and the northern barrier reefs, through Murray's Anchorage, Grassy Bay, Staggs and Two Rock Channels into the harbor itself, which is entirely landlocked and well protected from wind and sea. Grassy Bay is the naval anchorage where a fleet of English battleships may often be seen, and steamers of deep draught like Orotava of the Royal Mail Steam Packet Company, anchor here and transfer their passengers to a steam tender which carries them to Hamilton in about twenty minutes. Vessels of lesser draught, notably the steamship Bermudian of the Quebec Steamship Company, which lightens her draught four feet when nearing port by pumping out water ballast, can enter the harbor and steam right up to the docks, though the channel at Two Rock Passage is so narrow that a steamer of the Bermudian's width almost touches the shores on both sides. In Hamilton Harbor is a pretty litttle island known as the Isle of White, where many visitors go to bathe. A good way to see other points of interest in the harbor is to hire a rowboat, which can be obtained along the water-front, or else sail around in one of the numerous native party boats. Opposite Hamilton, across the harbor, in Paget Parish, is the little village of Salt Kettle, so named because in former days it was an important storage place for salt brought to Bermuda from Turks Island and from there shipped to the United States and Canada. It is a charming little place with winding paths and particularly luxuriant vegetation. Several native boats are anchored in the little cove here, and a steam ferry runs between Hamilton and Salt Kettle every twenty minutes. Many boarding houses are situated on this side of the harbor.

One of the best drives in Bermuda is to start from Hamilton, passing along the eastern end of the harbor through a famous row of stately royal palms, the finest on the islands, entering Paget by way of the Point Finger Road. On this road may be seen the Public Gardens, a Government experimental agricultural station, and also the gardens of Mr. W. Stanley Doe, where may be seen lovely flowers, strawberries and plants of many different species, some very fine birds and a few monkeys and rabbits. Not far from here are the "Sunnylands Gardens" where Mr. Theodore Outerbridge, a native florist, has a choice collection of plants, flowers and bulbs, and many valuable trees, including some rubber trees and Australian pines. Another florist's garden well worth seeing is "Seabright" on the Point Finger Road just beyond the Public Gardens. Driving along through Paget take the most southerly road which leads along

Coral Formation at Coot Pond

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high cliffs, where a view may be had of Hungry Bay and many deep chasms and precipices worn by the ceaseless action of the sea on the coral rocks over which prickly pear and sage brushes are found growing in abundance.

The South Shore of Bermuda along which the road leads is very striking in appearance because of the unbroken line of high and imposing cliffs which face the ocean here. On a stormy day as the foaming breakers of the broad blue ocean roll in against the shore with a dull roar, magnificent surf is dashed high up against the cliffs, making a superb spectacle. At the foot of the cliffs there are many stretches of sand, white and pink in color, minute particles of pinkish shells crushed by the heavy seas having been ground into the pure white sand, where fine surf bathing can be indulged in. The road is sheltered most of the way from the gusty winds by a high thick hedge of oleander bushes originally planted not as a wind shield, but as a means of concealment for the islanders, where they could hide and watch for invaders of any kind approaching from the ocean. Having passed through Paget, take the middle road through Warwick Parish, passing by Presbyterian Chapel, the oldest Presbyterian church in the British Colonies, in which building the celebrated preacher George Whitfield held services in 1748; and then by Thorburn Hall, a modern public building of very attractive appearance, until the celebrated Khyber Pass is reached. Khyber Pass is one of the show places of Bermuda, the road here being cut through solid rock, leaving high towering walls on each side, which makes a very striking spectacle. Driving through the Pass take the road to Gibbs Hill Lighthouse, passing by Warwick Camp, a military station where a rifle range is established and target practice often carried on.

Gibbs Hill Lighthouse in the westerly end of Southampton Parish stands on a high hill, which is two hundred and fifty feet above sea level. It is a splendid structure a hundred and thirty-three feet in height, built of iron which was imported from England at great expense. There are a hundred and eighty-two steps in the winding staircase which leads from the base of the lighthouse to the top; and it is well worth the visitor's while to ascend these steps, as a magnificent panorama of the Bermuda islands is spread out before one from the top. The light itself is well worth seeing as it is a revolving light with a prism lens which cost twenty thousand dollars. It shows a flash every minute and is visible thirty miles at sea. Halfway up the staircase is a platform with a registry book placed there in which the visitor can sign his name, and it is very interesting to glance over the pages of this book and read the names of people from all over the world written there. The writer visited the lighthouse when there was a heavy gale blowing but the force of the wind did not even make this magnificent structure vibrate, showing the extremely fine construction of the iron tower. Gibbs Hill Lighthouse is of great importance to Bermuda and has warned many a vessel away in the nick of time from the dangerous reefs which lie far out to sea off the islands. There is a signal station here where the approach of vessels is noted, and also a military telegraph office.

Coming back from the lighthouse another road may be taken which passes along the shore of Great Sound and around Hamilton Harbor. A beautiful little bay known as Riddle's or Heron Bay is passed below the lighthouse, and many views of enchanting little green islands dotting the blue waters of Great Sound delight the eye along this road, which winds around by Spithead, an attractive hotel, through Salt Kettle and finally back to Hamilton. The scenery here is very different from that along the other road, as this is on the sheltered side of the islands instead of the ocean side. An interesting sight on this road near Salt Kettle is the unfinished hull of a native boat that the builders have been working on more or less for thirty years and which is not finished yet. She is only a small boat but the funds for building her gave out from time to time and the native Bermudian never hurries, so there she lies, not yet done, a good example of the different way things are done in Bermuda from America!

This Gibbs Hill Lighthouse drive gives one a good idea of the country life of Bermuda as distinguished from the town, for it takes one over roads which lead through fertile farm lands and flourishing vegetable gardens, where everything seems to grow as if by magic. Farming is very different work here from what it is in New England and the Bermudian farmer takes life easy, working only when the spirit moves him. The writer has often been amused at seeing a little donkey dragging a plough along through one of these vegetable gardens, the soft red soil turning up with the greatest ease, while his little negro driver sauntered nonchalantly along behind. Most of the farmers are negroes, either native or West Indian, but there are a few Portuguese farmers who have been very successful. Many goats are seen here as well as in all other parts of the islands, and goat's milk is a favorite drink of the negroes.

Another interesting trip is to leave Hamilton by the morning boat for the Dockyard on Ireland Island, which can be inspected after obtaining a pass, and where the visitor can see arsenals, warships, torpedo boats, naval barracks and the new long breakwater which has recently been built; then take a carriage previously ordered from Somerset, and drive about Ireland Island visiting the Lagoon and passing by the Royal Naval Hospital, cross over Gray's Bridge to Boaz Island where more naval barracks and a convict station may be seen. From here cross another bridge to Watford Island, where another naval hospital is established, and passing over the new Somerset-Watford Bridge enter Somerset Island. At the time of the South African War many Boer prisoners were kept on Boaz and Watford islands, closely guarded by armed soldiers and surrounded by barbed wire fences. At the end of the War all but nine or ten of these prisoners of war, having taken the oath of allegiance to Great Britain, were sent home. The others who refused to take the oath still remain on the islands and do a good business in making souvenirs from the native cedar wood, walking sticks and the like, which they sell at good prices chiefly to Americans. The well-known stubbornness of the Boer nature is clearly shown in the case of these few men who refuse to take any oath of allegiance to England or to go home unless the British Government transports them free of charge to their own country. In addition they are endeavoring to sue the British Government for a hundred thousand pounds indemnity, claiming that while prisoners of war they were illegally treated. The natives, however, say that the Boer prisoners were so well treated here at the time of the war that the English soldiers became somewhat discontented, claiming that their prisoners were better treated than themselves. There are always two sides to a story, and the reader will have to choose his own side,

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the writer not considering himself well enough informed to give any opinion in this controversy.

The flourishing village of Somerset is in Sandy's Parish, on Somerset Island, and is so named because in 1610, Sir George Somers just before his death established a settlement here which he called "Somers' Seat," since contracted to Somerset. Mangrove Bay nearby should be visited, as it is an unusually beautiful sheet of water with little islets dotting it here and there, which in former times was surrounded by dense groves of mangrove trees. Mangrove Bay is connected with Hamilton by a steam ferry and many beautiful villas have been built around here. Other places of interest nearby are Long Bay, with its quarter-mile beach, Daniels Head, Tuckers Island Caves and St. James Church. Driving from Somerset back to Hamilton the road leads over Somerset Bridge, near which is a large house called "Bridge House," formerly the dwelling of the Tucker family, one of the best known families in Bermuda. West of the bridge is Elys Harbor, a charming little bay protected from the ocean by a hill known as Wreck Hill, at the head of which are the famous Cathedral Rocks, rocky pinnacles worn by the action of the sea into fantastic and picturesque shapes.

In Southampton Parish through which the road now leads there are stretches of unoccupied land which add a touch of delightful wildness to the drive. The principal points of interest here are Port Royal, formerly a seaport where the Royal Standard was first raised in Bermuda, the views of Little Sound with its many islands and finally Gibbs Hill Lighthouse, from which one goes back to Hamilton either by way of the South Shore road or by the harbor road.

Another interesting drive is to start from Hamilton and drive along the South Shore through Devonshire and Smith's parishes to Tucker's Town. This makes a beautiful ocean drive of the same character as the Gibbs Hill Lighthouse drive, though in an opposite direction. On the way in Smith's Parish may be seen the historic Spanish Rock, with its date of 1543 and the initials of Ferdinando Camelo cut there high above the sea. Spittal Pond nearby has a rifle range which is often used for shooting matches. The oleander hedges grow along the road here as well as in the other direction along the South Shore and add greatly to the picturesqueness of the drive. At Tucker's Town, the easterly end of the South Shore, there is one of the natural arches for which Bermuda is famous, formed by the sea wearing its way through the coral cliffs. The surf bathing is very fine here and at low tide some beautiful lagoons surrounded by rings of coral reef are uncovered. A good view of Castle Harbor, the large bay at the eastern end of the islands which is surrounded by St. Davids, St. Georges and Bermuda islands and several other smaller islands, is seen from this spot. This almost landlocked bay is famous for its marvelously clear waters and submarine coral growth, in which objects that appear to be near the surface are really far down out of reach, and where the sun casting its beams down to the very bottom tints the waters with dark green shades of color that are very beautiful.

The principal town in Bermuda next to Hamilton is St. Georges on St. Georges Island, at the extreme eastern end of the island group. A long causeway built of blocks of the native coral stone with a succession of neat wooden bridges connects Bermuda and St. Georges

Stone Dock in Devonshire

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islands and the approach to the town is very picturesque. St. Georges is one of the oldest English towns in the Western Hemisphere, named in honor of Admiral Sir George Somers who died here in 1610. It is a quaint old-fashioned town, with narrow streets and old style low houses, rich in its historical interest, for as the oldest of British colonial settlements it has preserved the traditions and monuments of those bold English adventurers who disputed with Spain the ownership of the New World. From its harbor in 1610 sailed the two ships Deliverance and Patience to the relief of the famine-stricken colony of Jamestown, enabling the English settlers to maintain their hold in the new land.

During the American Revolution gunpowder was stolen from the public powder magazine in St. Georges by some of the islanders who sympathized with the Americans and was sent by them to General Washington, who used it with great effect in the Battle of Bunker Hill. In the War of 1812 the American frigate President was brought into St. Georges Harbor after being captured by the English frigate Endymion, and one of her midshipmen, Richard Sutherland Dale, a lineal descendant of one of the Governors of Virginia, Sir Thomas Dale, died in the town from injuries received during the fight. At this time also a court-martial was held here which exonerated the captain and officers of the British frigate Macedonian for the loss of their ship, which was captured and taken into Boston as a prize by the American frigate United States. During the War of 1812 prisoners of war were confined in the jail which is now used as the post-office, and it is pleasing to note that the captured Americans received very good treatment while imprisoned here. While the American Civil War was being waged blockade runners carried supplies from St. Georges to the Confederate States and, if not captured, returned with cargoes of cotton which were reshipped to England.

The oldest church in Bermuda, St. Peters, built in 1713, is one of the most interesting buildings in St. Georges, having some very old memorial tablets on its walls and showing signs of its antiquity in the shape of its windows and doors, its quaint old-fashioned pews, its low peaked roof and its Puritan gables. Here may be seen a communion service of solid silver presented by King William III in 1684 and also a silver christening bowl given by the Honorable William Brown of Salem, Mass., a British Tory who became Governor of Bermuda from 1782 to 1788. Another interesting place to visit is the St. Georges Public Gardens, where the memorial tablet to Sir George Somers may be seen, as well as many beautiful plants and trees including some date palms over a hundred and fifty years old, and a curious old gray-colored branching tree known as a monkey puzzle tree. Not far from here is a house once occupied by the Duke of Clarence, afterwards King William IV of England, when he lived in Bermuda as an officer in the Royal Navy. Nearby are the ruins of a house where Nea lived, the girl to whom Tom Moore, the Irish poet, dedicated his Bermuda poems.

Tom Moore's house, Walsingham, one of the show places of Bermuda, is just across the causeway from St. Georges. It is said to be the oldest private residence on the islands and was occupied by the poet in 1804. Beside it is the famous calabash tree under which Moore used to sit and where he found his inspiration for that celebrated poem which begins:

"Oh could you view the scenery fair
That now beneath my window lies,
You'd think that nature lavished here
Her purest wave, her softest skies,
To make a heaven for love to sigh in,
For lords to live in, saints to die in,
Close to my wooded bank below
In grassy calm the waters sleep,
And to the sunbeam proudly show
The coral rocks they love to steep."

The memory of Tom Moore is tenderly cherished in Bermuda, for though Shakespeare, Andrew Marvel and Waller all have written about the islands, Moore is the only one who actually lived here, and his charming poems have made Bermuda famous for all time.

The fortifications of St. Georges are very strong and have a commanding position over any vessels entering Bermuda. Here are the headquarters of the Royal Artillery, whose barracks are especially fine and whose engineer shops, ordnance depots, gun carriages, powder magazines and army hospital show at once the military aspect of the place. Inspection drill is held here every Sunday as at Fort Prospect and after it is over the troops march from the parade ground to the pretty little garrison church to attend divine services. It is very impressive to see the officers in their gorgeous uniforms with brilliant hilted swords hanging from their sides in long scabbards, and also the smartly dressed soldiers kneeling in prayer in the little chapel. When the writer was here a soldier's daughter, a little girl about twelve years old, played the small organ which this chapel possesses, and three or four soldiers with a few other soldiers' daughters made up the choir, while an old army chaplain and the colonel in command of the troops of this station alternated in reading the services. The singing was very fine, most of the soldiers joining in, and these services always prove interesting to Americans.

At the northwesterly end of St. Georges Island is a small bay called Tobacco Bay, where there is a landing for the boats which attend the vessels lying in Murray's Anchorage and on whose shores there is a rifle range and close by the Naval Tanks. A narrow strip of sand separates Tobacco Bay from a curious inlet of the sea at the very tip end of the island near St. Catherines Point, which is known as Coot Pond, around which the rocks worn away by the ocean surges stand up in fantastic pinnacles. Near here also is Catherines Bay with its little beach on which Sir George Somers first stepped in 1609 when he landed in one of the small boats from his shipwrecked vessel Sea Adventure. Continuing along the road which leads by the shore here, passing Fort Alexandra on the way, one soon comes to a small bay known as Buildings Bay, where Deliverance, one of the vessels which carried Sir George Somers and his followers to Jamestown, was built. A splendid view of the ocean is seen along this road and Cemetery Hill, which stands inland a little way back from here, is used as a lookout station by pilots. A short way beyond Buildings Bay is a narrow channel known as the Cut, which is the entrance to the landlocked harbor of St. Georges. The Cut Road which runs over Barrack Hill affords some very fine views of the harbor and islands, and from here one can look down on the quaint old town and note how it is laid out with the houses facing on a square and every street opening into it, so that with a few cannon every thoroughfare could be commanded.

At the present time there is only seventeen feet of water at high tide in St. Georges Channel, which prevents vessels of deep draught from entering the splendid

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harbor of St. Georges. Many vessels anchor in Murray's Anchorage, on the north shore of St. Georges Island, either in distress or to secure coal, and the only way to get coal out to them now is to tow out lighters, a slow and laborious process. Several hulks of vessels stored with coal are kept anchored in the harbor from which the lighters are supplied when needed. One of these hulks has an interesting history, as it was originally one of two rams, The Viper, built in Scotland for the Confederate Government but afterwards bought by the British Government to end a dispute between the American Government and themselves in regard to the neutrality laws during the American Civil War. To give an idea of the importance of St. Georges as a harbor of refuge, the writer will say that he has seen as many as ten large steamers come into Murray's Anchorage during one week in search of coal or to make repairs.

Across the harbor from the town of St. Georges is St. Davids Island, a beautiful wooded island, on the eastern side of which built on a high hill is St. Davids Lighthouse, an octagonal stone structure fifty-five feet in height and two hundred and eighty feet above sea level, painted white with a red band about halfway up. Off St. Davids Head, which this lighthouse marks, all the ocean races for sailing and power yachts from the United States to Bermuda have had their finish line. From the top of the lighthouse there is a panoramic view of the islands similar to that from the top of Gibbs Hill Lighthouse. On the hill many of the Bermuda pilots, the majority of whom live on St. Davids Island, take their turn watching for incoming vessels. There used to be great competition among these pilots and a keen race would follow the sighting of a vessel to see who should first get aboard, but this has been done away with now, the Bermuda pilots having formed an association similar to those in the chief ports of the United States by which each pilot has his allotted station. Among the fleet of sturdy pilot boats which have their anchorage off St. Davids Island and in St. Georges Harbor are Isolt formerly Mineola, and Chispa, both originally sloop yachts designed by Edward Burgess as mentioned previously; St. George, Guard, Bermuda, Rescue and Secret, staunch Bermuda-rigged boats and Mic Mac, formerly a Nova Scotia fishing schooner.

The scenery on St. Davids Island is very beautiful and this is a favorite place for picnics. It has a very rich and fertile soil peculiarly adapted to arrowroot growing and its vegetation is most luxuriant. There are several boat-builders on the island, notably a young colored man named James Minors, who build boats of the native red cedar and turn out work fully equal to that of the best American boat-builders. When the writer was here he saw a new pilot boat under construction by Minors, which was also designed by him. She was 56 feet over-all length, 31 feet on the water-line, with 16 feet breadth and 9 feet draught, copper fastened throughout, with six tons of lead ballast on her keel, and in every respect a modern craft, costing about twenty-four hundred dollars. In Bermuda boat-builders work in the open air all the year round, which seems strange at first to the visitor from the North, accustomed as he is to elaborate boat-building shops and winter sheds.

Around St. Davids Island there are many pretty little islands and the scenery in this vicinity, with steep rocky shores covered to the water's edge with cedar trees, reminds one of the coast of Maine. A little steam ferry-

Characteristic View on South Shore of Bermuda

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boat plies between St. Georges and St. Davids and on this route there is an interesting passage between two enchanting little islands which is so narrow that the steamer can barely squeeze through. Castle Harbor, on the outer side of St. Davids Island, is dotted with many islands, among which Non Such Island, now a quarantine station, and Coopers Island are well worth visiting. Coopers Island is supposed to have buried treasure hidden on it, left by shipwrecked Spaniards and buccaneers in days gone by, and many treasure-hunting expeditions have come here, but as yet no treasure has been found. One of Washington Irving's "Three Kings of Bermuda," Christopher Carter, one of three who found a huge mass of ambergris, used to live here, and it is a favorite place for bathing, fishing and picnic parties. One of its chief attractions is a famous natural arch through which a boat can be rowed and which is the most regularly formed of all the Bermuda natural arches.

Another interesting island is Castle Island with its ruins of an old fort called "King's Castle," built by Governor Moore in 1612, which at one time was the main seat of defense for Bermuda. In 1615 history records that this fort drove back with its guns two Spanish ships which attempted to enter the harbor. Southampton Island nearby also contains the ruins of a fortification, known as Brangman's Fort, which was built in conjunction with King's Castle to guard the approach to the harbor. Across the causeway and near Joyce's Dock Cave is Coney Island, which is interesting on account of its curious gray stone square tower, known as Martello Tower, and also the Old Salt House, where salt brought from Turks Island to be afterwards shipped to the United States was stored in days gone by, in the times when Bermuda was famous for its "Salt," "Cedar" and "Sailors." Directly opposite the landing at St. Georges is a small island known as Ordnance Island, on which artillery supplies and munitions of war of every description are stored. The buildings on this island as well as all the other military buildings and barracks in St. Georges have been colored a reddish pink to distinguish them from the pure white of the rest of the town.

Outdoor sports are very popular in St. Georges, and tennis and cricket matches are frequent. On the football field behind the barracks soldiers practice every day and have at least one regular football game a week. The fishing here is as fine as anywhere in Bermuda, but the most popular sport of all is yachting, the splendid harbor of St. Georges being well adapted for this pastime. The St. Georges Y. C. holds several regattas during the season, outside courses being used when the weather is suitable, and courses inside the harbor when the wind is blowing hard.

At the time of the Bermuda ocean races the harbor presents a lively spectacle, several of the racers always making a stay here, while the natives turn out in force to welcome the visitors. Moonlight sailing is often indulged in and it is hard to imagine anything much more enjoyable than a sail around St. Georges Harbor in the evening, with the warm Bermuda air fanning one's cheeks and the bright silvery moon and tropical stars shining overhead, while the boat glides softly along over the sparkling waters.

The North Shore of Bermuda extends from the northerly end of St. Georges Island to Spanish Point at the western end of Pembroke Parish, opposite Ireland Island. The coast is bold and rocky along here, with fantastic caverns and irregular-shaped pinnacles worn in the jagged coral rock by the restless seas. Driving along from St. Georges the road leads by the shores of a beautiful little bay known as Mullet Bay, whose clear blue waters and green wooded shores always pleasantly attract the eyes of the passerby. After crossing the swing bridge and the causeway with Ferry Reach on the western side stretching out to the Ship Channel, and Castle Harbor with its landlocked waters spreading out on the eastern side, the road entering Hamilton Parish leads by Joyce's Dock Cave. Swinging sharply to the right one can follow the road around the western side of Bermuda's beautiful inland sea, Harrington Sound, or taking a road in the opposite direction one can follow along the eastern shores of this striking sheet of landlocked water. It is very interesting to take a boat and cruise around the Sound. On its northern side the shores are particularly picturesque, almost all of the famous Bermuda caves being near here while the scenery in this vicinity is wild and tropical and innumerable places of interest attract the visitor in other directions. In the middle of the Sound is Trunk Island, a splendid place for a picnic and a favorite place for boating excursions. The left-hand road passes by Shark Hole and picturesque Paynter's Vale with its eighty-year-old fiddlewood tree, where the dark red soil and luxuriant vegetation show the signs of an earlier Bermuda, and skirting the eastern shores of the Sound comes to the Devil's Hole. Here one can drive to Hamilton through Smith's and Devonshire parishes into Pembroke Parish or can take a road along the southerly shore of the Sound passing on the way a limestone rock formed in the shape of a lion and known as "The Bermuda Lion," and rejoin the North Shore Road again at Flatt's Village just below Flatt's Bridge.

The North Shore road after swinging to the right from the Crystal Cave passes the shores of Baileys Bay, of which the poet Moore wrote:

> **"That little bay, where turning in**
> **From ocean's rude and angry din**
> **The billows kiss the shore ——"**

A short way from here the road leads over a steep hill called The Crawl and skirting the coast soon comes by the Race-course, where horse races are frequently held. In former days the race meets were very well attended and some exciting horse-racing was seen here, but lately the entries for these races have fallen off somewhat. However, this probably shows only a temporary lack of interest as Bermuda, like all English colonies, has a love for horse-racing and the sport will doubtless soon take on a new lease of life. English officers take particularly to horse-racing and will never allow this pastime to die out here.

Just beyond the Race-course with its grandstand and oblong track is Shelly Bay, along whose shores the road leads in a gradual curve until it suddenly makes a sharp turn to the left and crosses Flatt's Bridge into the quiet village of the Flatt's in Smith's Parish. The only entrance to Harrington Sound is under Flatt's Bridge and through this narrow passage the rising or falling tide rushes in small rapids, the foaming waters dashing over the white rocks making a picturesque spectacle.

After passing the Flatt's Village the North Shore road swings to the right over Holly Hill, where a view of Gibbet Island is obtained, and skirts along the coast into Devonshire Parish, passing between the Garrison Golf Links on the left hand and the shores of Robinson

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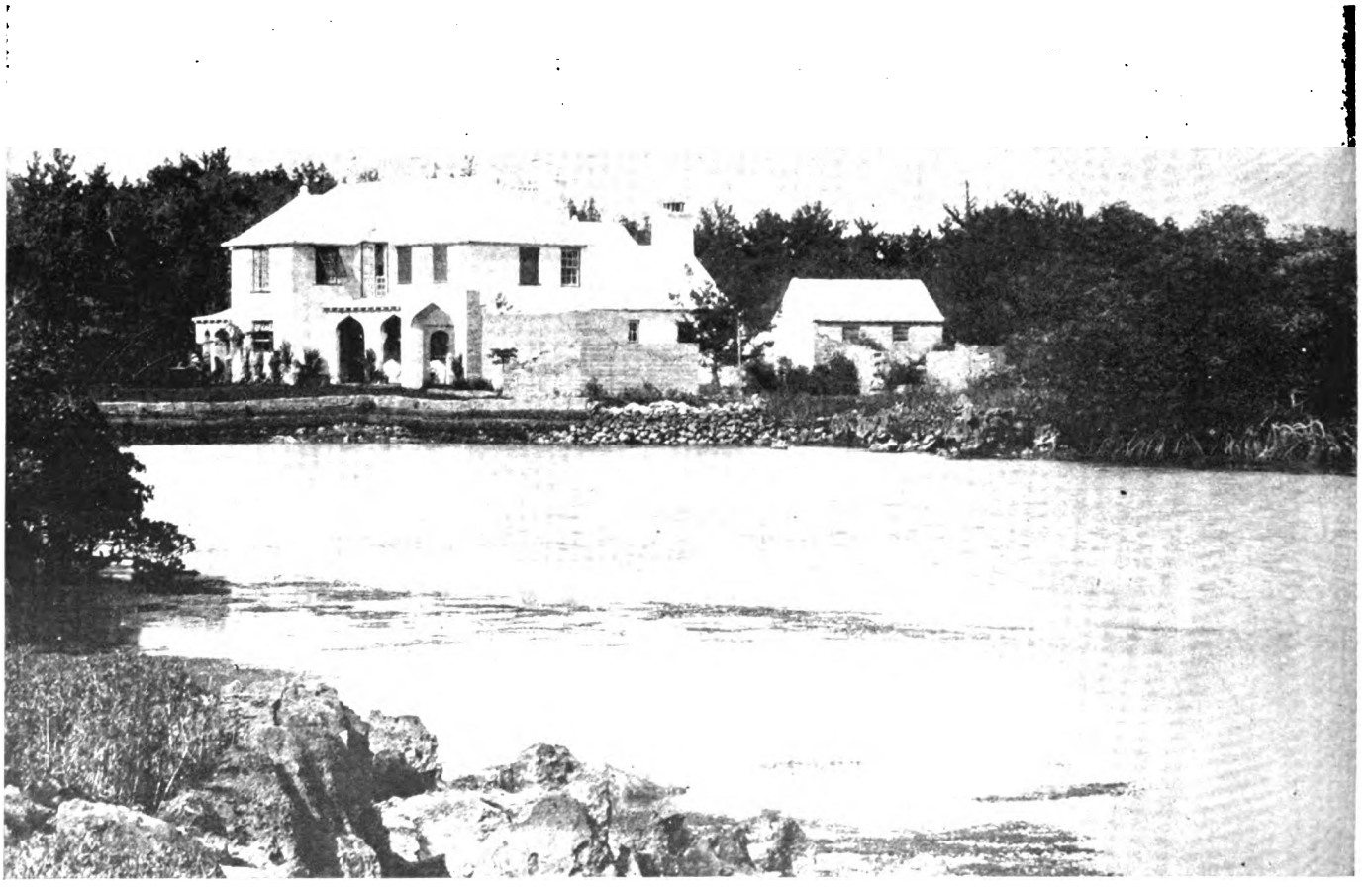
Bay on the right. A short way further on is Devonshire Dock, a little cove with a stone breakwater where a few small fishing boats lie at anchor, and beyond here the road soon passes Government House, which is partially concealed by the thick woods surrounding Mount Langton. On the North Shore a little below Mount Langton is the Ducking Stool, a rocky point where from the years 1650 to 1669 women suspected of witchcraft or other crimes were ducked by the authorities, and where a military pier is now built. From here the road stretches down to Spanish Point, with Mount Hill or Mount Arrarat and the golf links on the left, and Clarence Cove and Admiralty House with its beautiful grounds on the right. There is a pretty little bay off Spanish Point with stretches of clear white sand, and from this spot the Dockyard on Ireland Island and perhaps a fleet at anchor in Grassy Bay may be easily seen, while off to the east about fifteen miles away the dim outline of the shore of St. Georges can be made out if the day is clear. Some nine miles out to sea from here is North Rock, a pinnacle of coral rock among the northern barrier reefs which is all that remains of a former group of islands. It is a very interesting trip to sail out to see this rock, which is geologically the oldest visible portion of Bermuda, and also to view the surrounding reefs with their beautiful coral and sea-plant formations and their masses of many colored varieties of seaweed.

Outside Hamilton Harbor and south of Admiralty House there are several little islands and some picturesque landlocked sheets of water which are delightful to visit by boat. Mangrove Creek and a little inlet and lake known as Fairyland are particularly beautiful, and moonlight boating excursions here are very popular.

The Academy of "Mount St. Agnes" for white girls conducted by Sisters of Charity and the Bermuda High School for white girls are also located near Hamilton, while the stone quarries back of the Hotel Hamilton always prove interesting to visitors. Pitts Bay attracts yachtsmen as many yachts are moored here, while the lover of cricket will find the Hamilton Cricket Grounds, where many matches are played, a short way to the north of Hamilton. In Devonshire Parish the most interesting places to visit, besides Fort Prospect, are Devonshire Church, a very old building where the oldest cedar tree in Bermuda that once served as its belfry still stands and which is surrounded by old tombs, Happy Valley and the Cottage Hospital, a modern homelike hospital on the road between Hamilton and Prospect, which is of great benefit to both Bermudians and tourists.

The principal characteristics, scenes, and places of Bermuda have now been touched on and the writer sincerely hopes that these pages and illustrations have given the reader who has never been to the islands at least a slight idea of their rare charm and beauty. Bermuda is unique with its perfect climate, its delightful scenery and its hospitable inhabitants only two days' sail from New York. To those in search of a pleasant vacation or desirous of recuperating without going far away from home, the writer can think of no better spot to visit than this beautiful little pearl of the sea so bounteously endowed by Nature and so beloved by all who know it, *Bermuda.*



An Example of Bermuda Architecture. Tom Moore's House in Walsingham

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THE HABANA RACE FROM CALIPH

Ward Brinton

HORTLY after the start of the long race Caliph began to pick up on her competitors and soon had a slight lead. Caroline was the first boat over the line, slightly ahead of Caliph, with Berneyo behind her, and Ilys a little further off but coming up rapidly. Caliph seemed to be more than holding her own quite easily, and then what feeling of quiet exultation was in the minds of her crew!—for we all knew the Brooklyn boat was built to beat us, boat for boat. Down the river we sped, slipping past the shore. Yes, we were gaining without a doubt. And then "Bang! Thump!" a heavy shock against our bow, and the whole boat shivered and trembled; halted with speed and swerved a bit, while its clutch jarred terribly. Something grated and bumped along our keel, and we could all feel the propeller grinding some heavy object to pieces under the stern. Chief Engineer Hall ran on deck from the engine room. "What was it?" he shouted. "Did you see what it was —anybody?" "There is something in our wheel, sure." "Who saw it?" And we all ran astern, and saw floating behind us some bits of timber, broken by the wheel, the white of the freshly broken wood dancing on top of the water. "Is the wheel hurt?" every one anxiously asked. And then we listened to learn if there was any change in the throb of the engine or the hum of the propeller. "Do you think it is hurt?" we all asked. "Can't say," says Hall, "but if it did, it would surely be hard luck. It would put us out of the race almost at the start." And yet something was the matter, for, as we watched the other boats, we could see Berneyo begin slowly to creep alongside, and then forge ahead. Something must have happened, but what it was it was impossible to say. "Oh, hard luck! Hard luck!" murmured Hall, and we questioned him at once whether he thought we could go on. "Go on?" said he. "Of course, we will go on as long as we can keep the engines running, and even though we may not win, we will give them a race. But it is hard luck to have a thing like this happen so soon." And then down into the engine room he dove to take up that watch that lasted practically night and day, until we reached Havana in the lead.

At this time Loantaka was about 100 yards astern, leading Ilys, who led Caroline, with both Loantaka and Ilys hanging on to each other like grim death. After a while we could see that Loantaka began to creep up on us slowly, and the engine room gang became awfully busy adjusting, oiling, watching those engines as carefully as does a mother with her first child in its earliest illness. These engines being new, and not well tried out, the engineer had to cut down the revolutions for the first few hours of the race, and this gave the well-worn machinery of Berneyo and Ilys a great advantage. While these things were happening below, all of us on deck were wondering if anything had touched our wheel, for such hard luck to happen at the very start was distressing. Indeed, this anxiety may seem ridiculous to those not in the boat, but imagine starting a 1,200-mile race over wild waters, with every trifle counting big at the end, and then imagine how you would worry.

At Bulkhead Shoals further down the river, she was still behind, but had crept up within fifty yards, and then probably went in too close and smelled bottom, for she veered out suddenly, and Ilys, who was behind her, did the same. We had watched her carefully to see if she had gained, because Loantaka was the largest boat, and had been picked by many to win the race, and we felt that the battle as to who should reach Habana first would be between her, Berneyo and ourselves. After this, however, she seemed to lose ground, and we crept further and further in her lead, with Berneyo still gaining on us, and about a mile ahead.

And so down the bay it went,—Berneyo, Caliph, Loantaka and Ilys together, and Caroline behind.

At Stony Point Breakwater, Loantaka went inside the ship channel while we kept outside, giving us the shorter course, which her deeper draught would hardly allow. After we got below the breakwater, Loantaka was far astern, and at about Duck Creek she seemed to be headed across the bay. From this point on Loantaka faded away, and we saw her no more, and Ilys and Caroline also fell further behind. But ahead, Berneyo's stern was growing smaller and smaller, until she disappeared altogether as the dusk gathered into the night.

Then that first mess below! How full of questions from the amateurs! All about the engine, and the revolutions of the propeller, the oiling of the bearings, and the difference of speed; what advantage would the narrow Berneyo have in a seaway, with deeper draught, and less beam, and would she toss more in the head-seas of the great ocean, and so be held back in her speed? what would be the advantage of our greater engine power? and would not our reserve force, increasing during the night when the change in atmosphere would speed our engines, give us a chance to make up that distance? And to these things came many answers. But it all seemed to come down to the question of keeping our comparatively untried engines going at speed for six days against the better known and more used machinery of Berneyo and Ilys. Indeed, it seemed to us that if we could come in first at Habana, the greater glory would be ours. For, as Hall expressed it, "They are hounds on Ilys and Berneyo, and that engine crew

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on Berneyo doesn't know what it is to get tired. And don't you know they have been running her up and down the Sound all Spring just to get her in shape to lick this boat. Anyhow, we will give her a run, and that is the best we can do."

"Oh, thunder! I wonder what it is that has happened to our propeller?"

"Don't you know that Ilys is a wonder! There is no getting away from the fact that with her time allowance, if nothing goes wrong on her, I think she has got them all beaten."

And yet we all knew that bow ahead in the night was Berneyo speeding away from us, not coming back to us a bit. All during that first night we headed our course so as to pass between the inner and outer shoals off Cape Henlopen, cutting corners, under the direction of Captain Loveland, who would determine, as far as lay in his power, to make every inch of sea tell in our favor. A little gain here, a little there. A bit of skilled navigation, a shift of current, a slant of wind on our sail. To make up by skill that troubled throb under our stern which showed that everything was not quite right.

When the dawn broke on Sunday morning, May 22d, there was Berneyo coming out of the mist, a mile or more astern, with sails set and making good way in the sea, which had a nasty chop, and made our boat plunge and toss considerably. Berneyo had evidently gone around Fenwick Island Light, a longer course, which Loveland had foreseen, and by his judgment in giving her her way, had regained our loss. Oh, how good it was to feel that we were ahead, and had made up our falling away the first night. Our engines were working nicely and they seemed to be going as well as they could. for we were taking the seas beautifully, and it was surprising that such a small boat, driven so hard, should make so little fuss. The helm held steady, and she did not pitch or yaw off her course very much, and was not hard to steer. Indeed, this matter of steering was playing a great part in this amateur race, for, as Captain Loveland and Engineer Hall explained, a poor helmsman can make a boat sheer off and on her course so often and so much that at the end of a day's run the increased distance traveled would be great; or, at the same time, putting the tiller down too hard or too fast to bring the boat back on her course, holding it there constantly too much, acts as an awful check and makes the engine pound and slows the propellers, and stops the boat generally. Like everything else, steering must be studied and learned. To hold her steady when on her course, to bring her back gently, to know when to check and when to wait for her to come back herself on the next roll, in a race like this, with a trained navigator and engineer, but amateur crew to stand the watches, the question must be considered as a strong factor in the result; and I know, in a "ding-dong" race, as this is going to be, it will count for a lot.

After our first glimpse that morning of Berneyo she held a bit more to the westward, and closer to the coastline, in her run South to Cape Hatteras. We were further out, and it was evident that both of us at the end of this part of the run would converge at the Diamond Shoals Light.

The toss of the first night had made two or three of us feel pretty sick, and in the engine room, the sweet hot vapor of the gasolene was frightfully nauseating and stupefying. But that was part of the game, and there was not a murmur from any man. Every now and then one of the engine crew would poke his head up through the engine-room companionway for a breath of air, and mutter, "My, but it is fierce down there!" and then over certain distressing things that followed, it is just as well to draw the curtain. I might say here that seasickness will create havoc in any untrained engine crew, for it is practically impossible for a new man to keep from being ill and feeling miserable in the engine-room atmosphere; and where the engines require constant and careful attention to prevent really serious trouble, it needs a very alert man to keep on watch.

It is quite impracticable, in boats such as these, to have a full crew, and with one man out, the increased strain on the others, already worked to the point of exhaustion, is terrible. There seems to be something peculiarly distressing and nauseating in the smell of the gasolene. For not only does it make one sick, but also it is almost impossible to combat the drowsiness caused by the inhalation of the vapor. To stand watch for four hours on and four hours off, in a tumbling, pitching, tossing boat, with broken sleep and hastily eaten meals, is bad enough, even for those on the deck watch, but add to this the engine-room atmosphere, and the harder work below, it is easy to see that to work the engine-room squad in their foul atmosphere is a difficult task.

As this boat is crewed, five are below,—Hall (chief), with Lennig, Forbes, Minshall and Weingartner on watch; and on deck, Captain Loveland (chief in command and navigating officer), with Captain Crowley, Curran, Brinton and Bowes as watch. Commodore Brigham, owner of the boat, stood by, ready to help out upon any occasion, and on the way down he took his turn at the wheel. This gave a watch of two men above and two below on and off four hours each, with a chief in command of the engine room and of the deck. The hardest work, as I have said, fell on the engine-room watch, who, when on duty, had to be right at it in that hot room all the time; for the work on deck, with one man at the wheel and one man on the watch, in the cool air, was comparatively easy.

Caliph steered splendidly in quiet weather, and went with almost a balanced helm. Just a turn to bring her back to her course, and with the sails up, she almost steered herself. For the first day or two, on account of seasickness, it was a trifle hard for some of the men at the wheel, but after that passed away the work on deck was a pleasure.

During Sunday, when we were headed for Hatteras, Berneyo was to the eastward, and we lost her in the mist. All day it was good going, although a little rough. The engines were turning up well, but had not yet worked up that speed which Hall desired, and, indeed, we never did reach the revolutions that we wished; while always in our minds was the feeling that our propeller blade was bent, or that something had happened under our stern. There was a pretty sea and a good deal of a roll, which was somewhat uncomfortable. The men were not yet broken in to the cramped quarters and limited sleep, for it is not easy to start in on four hours on and four hours off and make up with naps in between. The sleeping quarters forward were uncomfortable, for the pitching of the bow was hard to stand, and so one watch had been turning in to the middle, double bunks, as the other turned out.

All day Sunday, through the slop, we headed for Hatteras, with the comforting feeling that Berneyo was to the west and probably behind. The moon rose to a murky night, and off to the westward the comet shone dimly between clouds. On deck the watch between eight

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and twelve had nothing to do but hold her to her course, for the Diamond Shoals Light off Hatteras. Just before the watch changed at midnight we passed to the west of the lightship, which we had picked up as precisely as if we had run down a line. As we passed we lighted our Coston signal, red, white, green and then red, reporting ourselves to the lightship. We got our answer, and then hardly had their fire burned away when from a half-mile astern Berneyo showed her flare, without waiting until she was abreast of the light. And then how good it was to feel that we had held her during the early part of the night, and that we were ahead; to feel that she was behind and that if all went well we would reach Habana first, even though we might lose on time allowance. To get there first was our whole idea. To beat the boat that had been built to beat us, boat for boat, was after all our great wish. After passing the lightship we headed out S. W. ½ W., so as to cut across the Gulf Stream, and make our course down the western side, and possibly catch a slant of trade wind far out at sea. Shortly after we started on this course, the weather got very heavy, and the plunging of the bow into the seas caused a leak of the forward deckhouse, then as the weather grew still more rough Captain Loveland thought it wiser to stand about and head back to the western side of the Stream again. This changed the original provisional plan, and the course now was for one curving along the Gulf Stream westward of its inner edge, and so down to the Florida Keys and Sombrero Light, and across.

Our boat was overloaded, especially forward, and did not rise to the head-sea as it should, and during this night when out in the Stream the engine-room crew added to their duties and moved a lot of the gasolene and water cans aft, and this shifting made her rise much more easily to the sea. During the next day and night the going was steady, our course being changed slightly to conform to the curve of the western edge of the Gulf Stream as it flows north. Work in watches went on with routine. Change and change about in the engine room and on deck, eight, twelve, four and eight, with the deck crew shifting watches with the dog-watch between four and eight in the afternoon. There was nothing especially of interest to note. The men were feeling in good shape, seasickness was passing away, and we were all becoming accustomed to our cramped quarters, to fall below as relief came on deck, strip off our wet oilers, and tumble into the little bunks for a bit of sleep until the next watch came; during the daytime to lie around on deck in the sun, to sleep, talk, smoke, tell stories, and to wonder at the outcome of the race.

On Wednesday night, however, the wonderful eclipse of the moon occurred, and it was awe-inspiring to watch the moon grow less and less, to fade away, until all that was left was a dark saffron disk shining in the clear star-spangled sky.

Then the next thing that gave us all joy was when Captain Loveland came on deck after an observation and looked around. "Well, well," said he. "That is pretty good. Right on the spot. See there? That is False Cape just above Canaveral, and there is the boat, and here we are. See, see," pointing to the chart. "See our course curving around the Gulf Stream. Well, what with learning the boat, slowing down for that head-sea yesterday, and bum steering,"—(Nothing personal to the amateur crew.)—"I think that's pretty good. Right where I thought we would be to-night, and if only I could feel that Berneyo was behind instead of about ten knots ahead, I'd feel all right all over. Come, see her there, right there, the light on Cape Canaveral."

And then how good it was to know that right over there was the little old United States. In fact, this spirit was over all on board. "Land, ho!" and all on deck, and there was the general lighting of pipes and cigars and a feeling of contentment. No thought of the tossing we got two days ago in the Gulf Stream; no reflection of the wetting of the cabin in the head-sea after rounding Hatteras, and when the pitch was so hard that the forward hatch leaked and made the forecastle a mess; no, not a word of discomfort from the engine-room crew, of all the hot, nasty, sweet, sickening smell of the oil and gasolene, no word of the horrid seasickness; where a man must be ill, but keep on oiling just the same,—"Oil up, oil up. Don't let those bearings grow hot. That's it"; and then ill again. This putting to sea in small boats, with an amateur crew, to do rough deep-water work, is nothing to be thought of lightly. Old ocean has no favorites—the same one to all—and a plunging head-sea on a boat like this, built for pleasure, wrenching and tossing, tries and works the timbers frightfully. Models of construction, yes; but look at the Gloucesterman forward,—solid oak, braced for five feet at the bow, decks thick and strong, with deck beams six inches across, and even then a crushing blow from the sea has driven the decks open. And what were we, a tiny dot on that wild ocean? How Old Neptune must have laughed, and thought to himself that "a touch of my trident, and I could send you all to Davy Jones' locker." How kind also he must have been to have held his hands aloof. Perhaps he, too, was wishing us God-speed and a happy ending to our voyaging. And perhaps, also, he felt the spirit that was in the mind of every one of us, who, like the helmsman of old, muttered his earnest prayer, "Oh, Father Neptune, you may sink me or you may save me; but sink me or save me, let me hold to my course." But the tumble of the sea, the leap of the whitecaps, and over our stern the rain-squall vanishing into the gray of the sea. Off the starboard bow the light of Cape Canaveral gleamed brightly, to disappear for an instant, and then shine bright again, keeping watch and ward, to hold in safety the travelers of the sea.

On Thursday, May 26th, at daylight, we found ourselves north of the entrance to Lake Worth, and then just as the day broke Berneyo came out of the mist about two miles ahead to the eastward. We were close inshore running down from Cape Canaveral to Jupiter Light, and to find her so close was fine, and every man on board was imbued with the spirit of this race, for, indeed, it was splendid sport to have it nip and tuck, to cross and recross each other, and to feel that we were fighting it out almost foot by foot with a boat and a crew that would meet you point for point; to know that if we won that we had won from a fine boat, and a fine lot of sportsmen; and that if we lost, that we had done our best, and must needs take our hats off to a better boat, and to a crew of men.

Berneyo stood in heading South by East until she was almost under the shore, so as to catch the slight southerly current that swept the shore to the eastward of the great Gulf Stream, and, as the light grew brighter, we saw her run in and report to Jupiter Light, and then swing out again, and seven minutes later we reported to the light, but with a pang we had to acknowledge at being second.

Down the coast all day, in glorious weather, past

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Lake Worth and Palm Beach, with the shark's fins cutting the water of the quiet sea, as we skirted the inlet at Lake Worth, and so close inshore that we could see the windows all closed in the great deserted hotel, and could get a wave from a lonely-looking personage at the end of the ocean pier.

During the day Berneyo seemed to gather speed while for a while we had a cross engine. I do not know any other way to express it, for before this she had been running as steadily and as smoothly as possible, but now, like an angry woman, she refused to be pacified, and for a while held her anger, even though the engine crew nursed her more carefully than a sick child, even though all the time we saw Berneyo becoming beautifully more distant.

It was a superb day and we were so close to that long, sandy Florida coast that we could have shouted to people on the beach if we had seen any. The whole coast had a deserted, closed-up look; all the cottages boarded tightly; nobody to be seen, and only an occasional puff of smoke from an engine on the Florida east coast-line inshore to make one sure that anybody was really there at all. I can readily see how in Summer this coast is left to a few natives, to the fishermen and the lighthouse tenders. In fact, to see the sharks floating along lazily at the entrance to Lake Worth rather made me skeptical about there being any fishermen there at all.

In the afternoon enough wind came out of the southeast to give us a chance to raise our jib and mainsail, and make a chase for it again, and after a while Berneyo came back to us until she got her sails drawing, and at Fowey Rocks, at about five o'clock in the afternoon, she must have been five miles ahead, but what cared we?—for it had been a great day. A ding-dong battle from the very start! with seamanship and skilled engineering the chief factor in result! In power-boat racing a great part, however, lies in having a skilled, patient and affable chief engineer and cheerful assistants; otherwise I am sure that the power of gasolene in eliciting profanity would add greatly to the number of future subjects of His Satanic Majesty.

Just before sundown Berneyo did not seem to be going as fast, and our engines began to pick up speed with the night, and every minute until the dark fell Berneyo seemed to grow larger, and without a doubt we were gaining upon her rapidly. At about half-past eight a coasting steamer from the south approached to the eastward of the shore. We were carrying no lights, for we did not care to let Berneyo know that we were gaining, and we were much surprised when Berneyo ran up her forward light, and flared her private Coston signal and reported to the steamer. She was abeam of us and probably a mile to the east, and it seemed that we passed her rather quickly.

Whether she had had engine trouble or had caught a bit of adverse current offshore we could not know; anyhow, it was fine to feel that for a third time we had crossed her: At Winter Quarter, sixty miles below Henlopen; at Diamond Shoals Light, off Hatteras; and this time off the Florida coast. It has been a splendid race so far, for much of the time has been spent in sight, either ahead or astern, and without this, with none of the other boats in sight, the entire trip would have had little of interest as a race, and would have been somewhat monotonous.

Well in the night we picked up the light off Alligator Reef, and it was here that Captain Loveland did his prettiest work, and which I think was chiefly instrumental in landing Caliph first in Habana Harbor. Berneyo was slightly further off shore, and it was absolutely necessary for us to take advantage of every bit of favoring current that flowed south in close to shore. Captain Loveland posted the watch with instructions to give him the character of the light and report to him constantly, so that he might direct the helmsman. As the boat kept a little offshore, the light shone white, and in close to the rocks we got into the red or danger sector. The man on watch was told to cry out when in the white, and Loveland would instruct the helmsman to keep the boat closer in so as to get in the rays of the red, which, when they were confused with the white rays, shone pink, and held us just on the edge of the danger zone, close to the rocks. "Keep in the pink," was his constant warning. "Don't get in too much in the red. Don't get out into the white. Keep in the pink." And so it was nearly all that night after midnight—in the pink, as long as we could hold that light in sight. So close into shore that a couple of hundred yards would have swept us on the reef; so close inshore that the little reverse current to the south swept us forward; while out further Berneyo must have met the greater weight of the Gulf Stream running north, and so was held backwards. About halfway between Alligator Light and Sombrero we struck out across the Gulf Stream S. W. by ½ W., and that morning, May 27th, when the sun rose, Berneyo was nowhere in sight. We had passed her in the night and gone ahead of her so far that now she could not tell where we were, and probably thought that as they were ahead of us at sunset, they had increased their distance and had left us far astern. There was a good sea running, and a bit of wind Southwest, moderate and squally, and gave us a chance to use our sails. The sea in the Gulf Stream made the boat yaw, and she was hard to steer, but this we did not mind, because we knew that we were on the last leg of the race, and heading away from the Florida coast to the entrance to Habana Harbor.

It was on this last portion of the course where Captain Loveland's judgment showed itself at its best. Sweeping northward from the strait of Florida, which lies between the Cuban coast and the Florida Keys, flows the Gulf Stream, which, in its center, at the point of maximum density, may run at a speed of over three miles an hour. To log a straight course from Sombrero to Habana would be impossible, as the force of the Stream curving around towards the northeast would sweep us far to the eastward of our harbor, and it required the nicest calculation on his part to determine just how far to the westward of Habana he should hold so that the force of this current sweeping us eastward would land us opposite Habana at the end of our run. Instead of steering due Southwest, the general direction was S. W. by W. This calculation proved to be almost exact, for we made practically no deviation from this original line. And the helmsman was repeatedly cautioned not to allow the boat to veer too much from her course. In fact, throughout the entire trip Captain Loveland was compelled to calculate the error caused by the unskilled work of the helmsmen, who, although they did the best that they could, were unable to keep the boat to that exact line which would be only possible for one more accustomed to such work.

On this last day it seemed rather slow, to be so near the end and then held back, as it were, by a nasty following sea, which caused the boat to jump around and yaw badly; and our only excitement was the uncertainty

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as to whether Berneyo was ahead or not, and whether we would reach port before she did.

About 2:30, under the bank of white clouds that overhung the length of the island, we saw the dim outline of Cuba. Oh, so far away she seemed; hardly discernible, at first; the outline for a moment, and then a cloud would hide the mountain peak that we saw; then, perhaps, the contour of a hill, and then more, until at last, about 4:30, everything was plain. Nearer and nearer! Houses! The white house west of Habana, and we knew that Captain Loveland had calculated the course and wind and stream and current correctly, and that almost without a shift of the wheel we could strike the harbor entrance.

Then all hands on deck, and such a scrubbing and shaving and a general fixing up, that even the engine-room gang tried to get clean. And so we were busy at it when a big Ward liner came out from the harbor, and nearer and nearer, until she was abeam of us, and only a couple of hundred yards away. We were going pretty fast—up to ten and a quarter knots—and looking well. Only the gang in the stern bathing must have been a lovely sight! But we didn't care—there was Habana only about five miles away. As the liner passed us she turned loose her whistle. One of the men in scant attire, having a bucket bath, grabbed the halyards of the American flag at our stern, dipped our flag three times in answer, and everybody on the liner's deck waved and cheered—whether it was at us, or at the man, or at the salute, I cannot tell. But we knew that he was waving back, and I wonder what they thought of these crazy Americans; though at that time nobody on our boat cared. And so we ran down to the harbor, and uppermost in the minds of all of us was the question, "Were we first or were we not?" and our hearts beat high as the little boats that clustered about the harbor entrance bobbed nearer and nearer. A big ocean-going tug ran our way, flying the Cuban flag, and the pennant of the Havana Y. C. Crowded with people and leaning over as they all pressed to our side. A graceful white yacht bright with pennants dipped through the sea, and behind it all grim Morro Castle rose clear, never to be forgotten, in the bright afternoon sun. The Government cutter ran in close, and cheered and dipped her flag. But were we first or not? We must be, for why all the boats and the cheers and waving of handkerchiefs? "Ahoy! Ahoy! there!" to the cutter. "Are we first?" "Oh, will they never hear?" "Where is Berneyo? Is Berneyo in?" "Oh, ahoy! Are we first? First! First! Are we first?" And then some one seemed to understand, and waved, and held up one finger, and then through a megaphone, "First, you are first. No one else. No one else yet. You are first." "Hey? Below there? You boys in the engine room. We are first, Berneyo not in yet." And then, oh, what joy! Bang! bang! bang! from a gun in the bow of a launch. Such whistling from the tug which turned in behind us; such a waving of handkerchiefs; such clapping of hands, only we could not hear them, but only noticed that they beat together. Down past the launches, which could not keep pace with us; straight for the harbor mouth. The tug was being outdistanced, the yacht was falling further behind, and as if alive to it all, the engines turned up 600 revolutions in the final spurt.

"There's the stake-boat. There! See her? There! Right over there. Hold her, for her stern. There! There! That's it!" And then, "Hurrah! Hurrah! You're first! Hurrah! Hurrah! Caliph!" And then, at three minutes and fourteen seconds past six, "Bang!" the gun from the stake-boat spoke, her flag dipped, a cheer came across to us, "Hurrah, Caliph! Hurrah! You're first. No one else in." And then with all the boats streaming behind, with rowboats, yawls, bumboats, and everything that floated in the waters of Habana Harbor, we ran under Morro, by Punta, right through the narrow harbor mouth. How they all seemed to flock about us, those boats. "Don't run any one down," was Captain Loveland's constant caution. "Look at all those people on the shore!" "Millions of them." "See the flags on Morro! The Cuban flag, and then the American flag, and the Havana Y. C. great burgee, flying together." And oh, the people on the lighthouse waving, and, bang! bang! bang! bang! came a salute from the guns on Morro—a royal entrance indeed.

Oh, the joy of it; first! First, after all those long night watches; first after all that toil of the sea, the tumble and toss; first after all the twisting to and fro; first after having crossed and recrossed Berneyo, and not a sight of her now from our stern!

"There's the quarantine boat!" And as we slowed up, alongside she came. "Hurrah, Caliph! You are first. Hurrah! Go slow, and we will show you your mooring. There it is, dead ahead."

Yes, dead ahead—there was our anchorage. "See!" "Yes, over there by where the bones of the Maine rose up out of the waters of the harbor, a mute reminder of those days when Morro and Cabanas were not bedecked with flags of welcome and when the Punta was not crowded with our friends.

Then between the Government tug of the commander of the port and the quarantine launch, with its shining brass and bright woodwork, we were escorted to the big rail buoy, where an agile boatman caught our painter and made fast.

How the boats flocked about; how the cameras clicked; how the people waved and cheered; how the pretty girls—oh, those pretty girls—laughed and fluttered their handkerchiefs! How!—but, what difference did it make if Berneyo did come in and win on time allowance, because after all those days on the sea we were first!

And that is what it seemed to all those pleasure-loving people and good sportsmen, who had watched for us all through that long afternoon. Yes, what difference did time allowance make to them? They were there to welcome the first boat in; to grant to her the honors of the victor; to follow her to her moorings; to close around her and clamber on board, and to shake hands with her crew.

And I think Commodore Brigham and Captain Loveland, and Chief Hall and the engine-room crew, and those on deck, may be pardoned for their little feeling of exultation and their pride in being able to land their boat across the line first.

And then midst all the excitement and handshaking and applause and tooting of whistles, and waving of flags, and when Caliph was literally surrounded by small boats, a member of the Reception Committee came up to Commodore Brigham and said, "Don't you boys stay too long out here, because there is a big time waiting for you in Habana." Oh, what joy was ours, then, when Commodore Brigham turned to us and said, "All you fellows that want to go ashore better hurry up, and don't be too long about it, either." And with more handshakings and applause and tooting of whistles we

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boarded the Government launch and literally fell into the arms of a waiting Habana.

One hour later, at 7:04, Berneyo crossed the line, the actual winner of the race on time allowance by two hours and three-quarters. But as a balm to our feelings we were informed by an accurate eyewitness that the first remark that they made upon coming within hearing of any of the boats was, "Have you seen Caliph?" "No," said he, "we have not; we have been aboard of her."

And in these few words may be almost summarized the feelings of Berneyo's crew, because we could understand that they, too, had felt the race for first place had been almost theirs, and that they must have wondered how we had gotten away from them in the night.

At 10:35 the next morning Ilys, Commodore Whitaker's racer, came in; at 6:38 of that afternoon Caroline crossed the line; and the hearts of all of us were made glad, for not a boat had been injured or a man lost on this, the greatest of all ocean races for small seagoing power boats. We were gathered together, sportsmen among sportsmen, welcoming each other as man to man, and about to receive the courtesies of a city which stands second to none in all the world for its hospitality.

After our arrival we learned that Loantaka had become disabled while still in Delaware Bay, and had been forced to put back. But it was a glad sight to us to meet in Habana Mr. Nelson and Mr. Smith, two of her crew, who, not to be outdone in sporting spirit, had taken train to Florida, and across to Habana by boat, and so were awaiting us when we arrived in the harbor. "For," said they, "we could not afford to have Loantaka arrive anywhere but first."

According to Caliph's log, she ran 210 miles the first day, or an average of 8.75 knots; 204 miles the second day, or an average of 8.50 knots; 185 miles the third day, or an average of 7.70 knots; 160 miles the fourth day, or an average of 6.6 knots; on the fifth day she made 199 miles, or an average of 8.30 knots; the sixth day, 190 miles, or 7.9 knots; and on the fractional part of the last day she made 46 miles, or an average of over 9 knots.

In a little narrative such as this, it is not possible to do any more than to make reference to the entertainment that was afforded to the visiting yachtsmen by the City of Habana and the Havana Y. C. during their week at Habana. Such hospitality has probably never been accorded to any visiting sportsmen anywhere. It was one continuous round of entertainment. Breakfasts, dinners and parties of all sorts. And at a special breakfast at the Havana Y. C. silver medals were presented by the Mayor of Habana to every member of the visiting crews, and at the ball given in honor of the racers, not a man but lost his heart to some Cuban enchantress. Everywhere the greatest interest was felt in the race, and upon the minds of all of us was deeply impressed the fact that we were not only among friends, but among true sportsmen.

While in Habana Harbor the racers were dry-docked, hauled out for inspection and painting, and on examination of Caliph's propeller, we found it a bit bent, but not seriously. What struck our view as important was that a groove had been worn in the ship's rudderpost aft of the wheel, as if something had hung there and dragged or had been caught to the wheel and been swung around until it had worn the wood away. It may be that we had dragged a bit of that box for a long distance and that it had held us back throughout a great portion of the race. But of this, however, we cannot tell. We did receive a shock, and we did seem to be held back by something. As to exactly what it was and for how long we can never know. Whether we would have won the race without this accident is impossible to say, but there was a feeling in the minds of all of us that with a little adjustment of our engines and repair to the wheel, and with a slight alteration in the loading of the ship, we would make a very far different record on the home trip, and all of us were eager for the return race, for we felt that on that second trial for speed we would beat Berneyo badly. Events proved that this was correct, and on the homeward run Caliph led Berneyo by 9 hours 25 minutes and 9 seconds, actual time, or considerably over five hours with the time allowance deducted.

After the week's gaiety, delightful as it had been, the men were ready and anxious for the race home. Especially was this so to the owner and crew of Caliph, who felt more than ever certain that they would be able to defeat their real antagonist, Berneyo. On the way down, the engines had become tried out, and towards the end of the run were working more smoothly than ever, and Chief Engineer Hall felt less anxiety about his being able to bring them home without a stop. On this first run, too, we had studied the action of the boat carefully, with special reference to her behavior in a seaway. According to the designer's water-line we had her loaded correctly, but practical experience showed us that the weight in the bow had pulled her down too much by the head and that she did not behave exactly as she should in a head-sea. It was obvious that she required more weight aft, and to correct this we carried the heavy anchor cable amidships and coiled it in the central cabin. The directions given by Engineer Hall to the engine-room crew were to draw gasolene as far as possible from the forward tanks, and so still further lessened the weight in the bow of the boat. All unnecessary stores and all the extra water cans and gasolene cans were stowed along the rail aft of the center of the boat. The effect of this diminution of weight forward was immediately noticeable on the homeward run. There seemed to be no lagging in a head-sea, and altogether she rode more easily and lightly. To add to this lessening in weight, while the vessel was dry-docked in Habana an auger hole was run up through the bottom of the boat into the bilge, and the vessel was thoroughly drained. We were surprised at the amount of water which was present. Much of this we had carried from Philadelphia, as the boat had never been thoroughly pumped dry. We had attempted to do this on the way down, but the pump became clogged with the amount of chips and debris that had collected in the bilge while the boat was being built, and it was impossible to get the water away. As Mr. Hall expressed it when he saw the vessel dry, "That will give us at least two hours better time on the way up." To add also to the rapidity of the wheel, which had never run up as high as we wished, Mr. Hall cut a small section off the blades of the propeller. This proved to be wise, for on the way up the revolutions ran from 580 to 600, a considerable increase over that on the way down.

Owing to the high cost of gasolene in Habana, the Regatta Committee arranged that the homeward race should be run in two sections, the first leg of the course being from Habana to Key West. Here the boats would take on gasolene and oil, and then as quickly as possible come to the line and together make a second start for

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the finish off Young's Pier at Atlantic City; the time spent at Key West to be deducted from the actual running time, the entire race to be run as if without a break from Habana Harbor.

Early in the afternoon of Saturday, June 4th, all hands were on board Caliph ready for their home race. Commodore Brigham ordered the boat out to sea for a short run to test the engines and make any alterations in the loading of the boat, and we were all at once struck by the difference in the way she behaved after her improvement in trim. This last afternoon was a bit monotonous, for the men's minds were still filled with the happy memories of the entertainment at Habana, and we were not at all sorry when at 5:45 Gypsy, which had anchored off the starting line, sounded the preparatory gun to make ready.

All along the sea-wall people crowded to watch the start. The magnificent driveway extending along the ocean and harbor was black with carriages and automobiles. The Habana papers had advertised the start extensively, and the whole city seemed to be down along the harbor entrance to watch the beginning of the race. On this homeward trip their interest was naturally more keen, because Berneyo was carrying the flag of the Havana Y. C., and it was natural that most of them should desire to see their boat lead at the finish. Caliph, however, had made many friends, and as far as we could judge most of the bets were in our favor. Like all Southern peoples, the Cubans are fond of backing their opinion and I would hesitate to say how many dollars were wagered on the result. All of us felt that, irrespective of landing our boat in first and the sport and pleasure it would give us, we also had to consider those who complimented us by backing their opinions. Mr. Carlos Carbonell, Commodore of the Havana Y. C. and owner of Gypsy, had arranged that he would accompany us to Key West on his boat, with the idea that he would lead the way and anchor near the buoy off Sand Key Light, the entrance of Key West Harbor, and act as stake-boat. To aid him in this he had invited a jolly crowd of Cuban sportsmen to accompany him.

The first gun boomed from Gypsy that we were to get ready to start at 5:45, and in between the numberless small boats that were thronging the harbor the four racers jogged toward the line. Berneyo was a lithe greyhound, Ilys a pretty picture with her bright flags floating in the air, the sturdy Caroline ready for heavy weather, and Caliph anxious and eager for the homeward run.

It was a beautiful sight to see all the small boats clustering about, darting hither and thither, the crowded but happy, eager persons who waved to each of us glad farewell, good luck, God-speed, and all the joyous farewells of a fun-loving people. Over to starboard was grim Morro, her flagpoles bright with fluttering pennants. Thronging the rail of the lighthouse high above the walls a crowd of pretty girls fluttered handkerchiefs and waved their hands and a happy God-speed. Oh, it was sweet to be there, to feel that life was worth living, to look around and about at all these good things, to know that each and every one of us carried the well wishes of those upon whom we gazed.

But it was chiefly at Berneyo that we looked, for they knew that we wished to beat them more than all the rest. In fact, it was generally known in Habana that there was some feeling between Berneyo and ourselves, and we felt that Berneyo was afraid of us; and we knew at this time that it would hardly do to come in first, but that we must actually win over her time allowance.

And then, too, came other questionings. Ilys, skillfully navigated and assisted by the current in the Gulf Stream might do wonderfully, and Caroline with a chance to use her sails in heavy weather would be dangerous; and always Berneyo, the swift and sleepless, was in our minds.

And then bang! went the get-ready gun, and all the little harbor boats and tugs and launches centered about the start, and a six-oared racing cutter pulled out past the Narrows and cheered us as we went by. "Get ready there." "Hold her to the start." And then at six o'clock bang! from the bright gun on Gipsy and we were off, with Berneyo over under the walls of Morro across first by ten yards. Then ourselves, followed by Ilys and Caroline over towards the Punta. But it was at Berneyo that we looked first. And then how the people cheered and the flags on Morro dipped as Gipsy, turning gracefully on her heel, trailed in astern. For, as I have said, her idea was to cross the Gulf Stream with us, to lead the way to Key West, and act as stake-boat at the finish of the first leg of the race. Berneyo was leaping ahead like a gaunt greyhound, and it was pretty to see how she rose to the swell and chop of the sea and turned her long bow and cut through the water like a shark. Her deck crew ran forward to set her jib, and we did the same. She had led us at the start, but almost immediately we gained, and as soon as our jib drew we began to go away from her. Her men looked vexed, and we laughed, and I know that they saw us, and felt that it was we and they on the home run. "Oh, you Berneyo," was our word. "We have got you now." And we all felt happy at leaving her.

Our engines were doing splendidly as they gathered speed, and with our boat trimmed more by the stern and light, without the great weight of the gasolene, which we were to get at Key West, we sped like a different boat, and I think Berneyo must have wondered. We had intimated to Mr. Granbery, her owner, that on the home race we would show him up, and this looked like it, as Berneyo began to trail behind. Ilys and Caroline were dropping astern, and Gipsy was making bad going of it in the choppy sea and falling behind Berneyo, and it did not look as if she would lead the way to Key West and, as planned, act as stake-boat.

As the light failed and the shadows faded away, we were well ahead and gaining. Ilys had gone over to the west, Caroline more to the east, with Berneyo in our wake a half-mile astern, and then after a while their lights were but a twinkle, a shifting dot in the broad tumble of the sea, and then they were hard to find, until they fell still further astern and were lost in the darkness of the night.

Captain Loveland was attempting to lay a straight course from Habana to Key West, holding a bit to the west of a dead line so that the current of the Stream would sweep us up to the light. This he almost did, for we only made a very slight deviation toward the latter part of our run. We picked up Sand Key Light finely, and ran alongside our buoy at 2:10:55, and burned our private signal to the Sand Key Light. Gipsy had not arrived, nor had we expected it, for when her lights faded away in the night she was far astern and making heavy going in the choppy sea, and we all wondered as to the condition of that jolly crew, and whether they would enjoy the trip as much as they had anticipated.

According to the rule of yachting, in the absence of

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a stake-boat the first across the line shall take his own time and act as stake-boat and take the time of the others in the order of their arrival. So, on crossing the line we showed our light and waited patiently for the others. Berneyo was not in sight, but at about 2:30 we saw her lights to the westward, off by the light. She had not made as straight a run as ourselves, but was forced to shift her course considerably and run from the light down to the buoy, and as she came towards us we gave her the directions as to finding the buoy, which she crossed at 2:42:06. After a while we saw Ilys' lights. She had gone still further to the west and had gotten into shallower waters beside the light and had to come out and around towards us, and so lost considerable time. While we were watching her, Caroline appeared and made a fine run with them for the stake, which Ilys crossed at 3:35 and Caroline at 3:37.

Gipsy had come in after Berneyo and took the time of the last two boats, and together we all anchored in the broad reach off Key West waiting for the dawn, when we put into harbor to take on our gasolene. It was a happy crowd on board Caliph, for we had caught up 32 minutes and 49 seconds on the time allowance on the first run of 80 miles across from Habana, and at that rate of gain we would more than cover the allowance granted to Berneyo on the run to Atlantic City. Indeed, we all felt that without accident or any hard luck the race was ours. The crew was in splendid spirits, not a man ill, and a quiet confidence pervaded all on board in the skill and ability of Captain Loveland to navigate the vessel, and in the knowledge of Chief Engineer Hall in the engine room. To add to this was the all-pervading, helpful presence of Commodore Brigham, who seemed perturbed at nothing, but always quietly and gently accepted each little set-back, nor ever seemed put out or angered or excited at any little adverse happening. To win for him, who was such a good sportsman, was the feeling that pervaded all on board, and in every man was the spirit that no matter what happened he would do his best.

During the remainder of the night we waited outside the harbor until at five o'clock Gipsy fired a gun notifying us that it was time to proceed at half-speed to the dock at Key West for gasolene and oil and water.

During all that Sunday the crews were kept busy. The sun was so intense that the iron drums in which the gasolene was brought down to the wharves became so hot that they almost burned one's hands, and the transferring of the gasolene was rather slow work. There was little opportunity given to the men to leave the wharf, but some of them managed to go for a short stroll into the town. They were much impressed by the difference between Key West and the beautiful, brilliant City of Habana,—a flat town on a hot Sand Key, far away from everything and everybody. To us so filled with happy memories it seemed a sad place indeed.

Gipsy, which had anchored alongside one of the docks, became hard and fast aground at low tide, and during the afternoon it became quite evident that she would be unable to proceed outside the harbor to act as stake-boat, and so it was arranged that a Government launch should take Commodore Carbonell and his guests out to the starting point.

After a long, hot day we were all glad when we pulled away from the dock and received the preliminary gun to make ready for the start. Here there was no fleet of happy spectators, no cheering or waving of handkerchiefs, no fluttering of gaudy pennants, or the snapping of cameras. Only a long, low sand spit and dingy houses, a waste of land by a waste of sea, which glistened hot in the tropical sunlight. Here and there a flying fish shot from the waters, flashed for an instant, and settled with a splash into the glistening sea; a shark fin cut the wake of the stern; and up aloft a frigate bird circled around with motionless wings under the burning sun in the cloudless sky.

At 4:45 we got the gun to start, and in a moment all were across the line for the final leg of the homeward race. Ilys, to the westward, was across the line first; Berneyo led Caliph by about 20 yards, and Caroline came in at the rear. Berneyo was fairly racing through the still waters, and for some time it seemed as if we hardly gained at all, and then we knew that we were a little nearer, and then the letters on her stern were still more plain, and it was a gain by inches. A pretty race indeed! After a while she was abeam of us, as we tore over the silent sea, and finally, as once more the shadows grew gray with the coming of the night, she began to fall astern until at last her lights twinkled bright in the deepening night as she raced along behind a half-mile in our rear, with the others still further away.

And so through this long, quiet, hot night we ran, the watches changing methodically, and the engines turning up to 580 revolutions, and as easily and as steadily as if they did not know what it was to check their speed.

The next morning, Monday, June 6th, Berneyo was thought to be seen at daybreak far astern, but of this we were not sure, and we did not see her afterwards.

We passed Jupiter Light too far out at sea to signal. It rained a little in the forenoon, and we set our sail, but as there was scant wind we were forced to take it in.

The next day, June 7th, at 3 a. m., we met such a heavy squall of rain that it was impossible to see more than a few rods. This lasted for an hour or two and daylight found us in a light air, which suddenly changed to a cold Westerly wind, and made us all feel at once that we were getting into the northern waters and the good old United States. During that day we had heavy, squally weather and were forced to take in our sail and make everything snug on account of the Northwesterly wind. Again Captain Loveland showed his ability by taking advantage of every slant that was possible between heavy squalls.

It was impossible to make observations by the sun on account of the squally weather, but in the evening he was able to ascertain our position by the stars. It was very important for him to know exactly where we were, so that we could remain in the Gulf Stream and so obtain the full benefit of the current sweeping us forward.

At two o'clock in the morning of the 8th, Captain Loveland was able to take an observation by Spica Arcturus and the North Star. There was a heavy sea running, with a strong wind, which cautioned us to work away from the center of the Gulf Stream to the westward, which we did gradually, but were required to drop our speed to five knots.

About 9 a. m. we came alongside of Cape Lookout Lightship. There was no one on deck, and Captain Loveland hailed, and on his shouting all hands turned out hurriedly. They seemed surprised to find us so close under their lee. Through the megaphone we questioned them as to whether they had seen anything of the other racers. The commander of the lightship, who was evidently a joker, told us that No. 5 had passed two days before and

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was probably in Philadelphia by this time. It did seem to us that his information was a little ill-advised, and that his joke was somewhat far-fetched, because we really desired knowledge and could not quite understand his action in this matter.

The sea was heavy, and all that day until about 2 p. m. we were shipping considerable seas forward. About four o'clock the wind and sea dropped somewhat, and we were able to run our speed up again, until with the aid of our sail we were able to cover over nine knots.

At 7:30 we held Diamond Shoal Lightship off Cape Hatteras on our beam, and traveling at speed we picked up and passed Bodie Island Light at about 10:40. It had been raining hard, with considerable wind from the east. The boat behaved beautifully, and we all felt that without any accident we would make a record run. We regretted exceedingly that we had to work out to the westward of the Gulf Stream, but we all felt that it was wiser to get into the long roll of the ocean there, even though we failed in the assistance of the current, than to stay in the choppy head-seas of the Stream, which were holding us back considerably.

By the morning of June 9th we were in a squall, and it was extremely disagreeable for those who were below and in the engine room, for on account of the sea and rain it was not possible to have the companionways open, and the ventilation of the engine room was poor. During the afternoon of the 9th we picked up and passed through the fishing fleet that was working to the eastward of the Delaware Capes, and it was a beautiful sight to see those graceful schooners at anchor or jogging to and fro when they shifted their positions, and to all of us it was a wonder that the small dories of the hand-liners should rise so easily and safely in the heavy sea.

About five o'clock we passed Fenwick Island Light abeam, and at 6:55 p. m., Five Fathom Bank was off our starboard bow. At this time heavy rain, squally weather, and half a gale of wind made up from the eastward and our boat was running from 9½ to 9¾ knots with our mainsail up. At the rate of speed we were traveling we calculated that we should reach Atlantic City before midnight.

It was at this portion of the race that our boat went through probably the severest weather that it did in its entire trip. The wind increased in violence from the east, and the sea became very rough, and the boat rolled considerably, although we were all greatly pleased at the admirable way in which it behaved. With the mainsail up the roll was steadied considerably, and it was seldom that she made much of an angle on the reverse roll.

All the way up the Jersey coast we ran during the early portion of the night, and every few moments picked up the lights of some new seashore resort along the coast. About ten o'clock away ahead we were able to see the bright glare of the lights of Atlantic City, and without decreasing speed at 10:45 picked up the lights along the Boardwalk.

Oh, how pleasant it was to think we were at last so near home, and although we would have preferred to come in and make the finish at daylight, yet none of us would have missed the splendid excitement and sport of bringing the boat home in such a gale. How she rocked to and fro and plunged with the head-sea; how the spray flew almost with the force of shot back from the bow into our faces! For an instant she came to the crest of a wave, she would pause, steady herself, we could feel the wheel tremble under our stern, and then with a pitch and slide down would go her bow and dip into the coming sea, only to rise again, tremble, and over as easily as a bird. Indeed, that was the sport of it all; sport to feel that here we were in the grip of nature, that nature who knows no favors, and can be only conquered by those who meet her power face to face, without flinching.

And so up towards the pier we went, and at eleven o'clock flashed our private signal. "Which was the pier? Where was the finish line?" For with all the mass of lights on the Boardwalk and the hotels, it was difficult to make out exactly our position. And then as a glad sign an answer to our flare, and the red and green and white of the yacht club shone out from a spot over the water. There was the finish, and there was an answer to our flare. Again we made our signal, and again an answer, and at 11:06 we passed the finish and the end of this long race.

The run was over. We felt that the race was ours, for never on the entire course had the engines misbehaved—always it seemed that they were crying out, each cylinder to the others, "Hurry, hurry, hurry, hurry; faster, faster,—never a miss, never a check, for don't you know that we must win; hurry, hurry!"—and then how the wheel would spin under our stern; how the ocean would slide by; 580, 600 revolutions; 9¾, 10, 10¼ knots, on the Nicholson log. Oh, they could not beat us; they must be far behind; and on this second trial of speed we were truly first.

In the tumble of the sea it was impossible that night to make an entry over the bar. The ocean was far too rough, and we knew that the buoys were not lighted, and so off and on we held throughout the night, until early in the morning as the day broke all hands were on deck to take her across the bar. Then in the gray of the morning we picked up the outer buoy as Captain Crowley held her stern to the sea with her bow pointed towards the shore. Ahead of us tumbled the rush and foam of the breakers as they thrashed across the shallows, and towards the center by the buoy seemed a spot where the water seemed less foam-flecked. "Hold her to it," was the cry to the helmsman. "Don't let her veer." And "Keep her bow to the mark." So under the directions of Captain Crowley and Captain Loveland we swept across, passed by the buoy into the still waters beyond the bar; and then just as we came across into the quiet Captain Loveland broke forth into song, and over that little boat almost solemnly came the words of that great sea hymn "Crossing the Bar."

Since our first evening off Key West, Berneyo had not been sighted, and after our landing at Atlantic City we heard that she had been reported some 70 miles astern. She crossed the line at 7:58:20, 9 hours, 25 minutes and 9 seconds actual time, or over five hours behind us, with their time allowance deducted.

At 1:26:45 Ilys made her finish and won second place by 2 minutes and 15 seconds over Berneyo; and later Caroline came in and took fourth.

And so ended the greatest of power-boat races over the deep sea—a matter of history in power-boat work; a race to be proud of; without a loss, without a breakdown, with every boat returning, battle-scarred maybe, but more fit and tried than at the start; with every member of the crew in splendid health and spirits; with minds full of happy memories of pleasant places, of charming people, of good sportsmen; to all of them a brightness of the eye, a squaring of the shoulders, a roll and spring to the walk, and in the hearts and minds of all a song of praise for everything—for it is good to live!

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STARTING THE ENGINE

Herbert L. Towle

HAROLD PRETTIMAN had just acquired a 30-foot gasolene launch with a 30-h.p. four-cylinder engine. Harold's father was secretary of the bank which Harold had lately entered as assistant paying-teller, and in selecting the launch Harold felt that it was incumbent on him to uphold the family name. He knew nothing about gasolene engines from experience, but he bought a book on the subject and read it carefully. His first lesson was taken under the guidance of the salesman while piloting the launch from the city to the yacht club. The engine ran like a sewing machine, and pushed Idle Ease, as he had christened the craft, 18 miles an hour or faster. For several afternoons following, Harold took the boat out on short spins to familiarize himself with the details of the oiler, the battery and coil, the management of the reversing gears, and the science of making a landing without knocking a hole in the hull.

One morning Harold awoke early and conceived the idea of going down to the club before breakfast and getting in a half-hour's practice spin. The clubhouse was deserted when he got there, and the air was sharp—even frosty; but Harold set to work cheerily with the oil can, turned on the gasolene, closed the switch, primed the carbureter, and turned the crank.

To his surprise, no answering chug followed. He turned again, with the same result. Recalling his book of instructions, he carefully counted off the preliminary operations, and made sure that none had been missed. Gasolene dripped from the carbureter when the float was depressed, showing that there was no lack of fuel. He flooded the carbureter and tried again. Still no response. Then it occurred to him that perhaps the batteries were weak. He turned down the contact screws of the tremblers till they buzzed their loudest, and cranked again. Still no explosion.

Mystified by this time, he took out the spark plugs one by one and tested them. The sparks were there, but somehow they seemed small and weak. Glancing ashore, Harold saw the steward on the club float watching the proceedings, and hailed him. The steward did not profess to know much about engines, but he had nothing else to do, so he rowed out to Harold's launch to lend sympathy. Harold exhibited the attenuated spark.

"It don't really seem like a good hot spark," agreed the steward, somewhat doubtfully. "Maybe if you were to spread them little points further apart you'd get more of a flash." Harold hesitated. If a wider gap between the spark points were the proper thing, presumably the spark plugs would have been made that way in the first place. Nevertheless, he had read that a strong spark would frequently fire a mixture which a weak spark would not ignite. So he took the blade of his knife and

Rosetta, a Massachusetts Bay Type. Note the Small House Aft for Engine

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spread them an eighth of an inch apart. The result was splendid, to the eye at least. The sparks crackled with twice their former energy.

He decided to make sure of having the sparks strong enough, so he opened the points another eighth of an inch. Then he put all the plugs back in place and confidently turned the crank.

When no explosion followed, he primed the carbureter again. When the power still refused to come, he sat down to think.

"I heard tell," volunteered the steward, "that they sometimes squirt gasolene right into the top of the engine when they want to start off quick."

Harold jumped up. "The very thing!" he exclaimed. "I'm a lobster not to have thought of it!"

There were no priming cocks on the cylinders, so Harold unscrewed the spark plugs. He had no gasolene except what was in the tank, but he formed a cup from a piece of paper, drew some gasolene from the carbureter, and tilted it through the spark-plug holes, after which he replaced the plugs once more. The idea occurred to him to investigate the timer, so he removed the cover. Everything appeared to be in order. He took a bit of wire, and, with no special object in mind, short-circuited the timer first through one coil, then through another to hear the tremblers buzz. At the third contact, a single chug made his heart leap. The engine had jerked a half-turn backward and come to rest.

"There, now!" jubilated the steward. "Now you got her, sure!"

Harold turned the crank eagerly. To his unspeakable chagrin, no response followed.

"Chuck in some more gasolene and try again," suggested the steward.

Harold did so, feeling somehow less sanguine, but seeing nothing else to do. This time he made sure of having enough gasolene by filling an oil gun with that fluid and squirting a quarter of a gunful into each cylinder. Strange to say, the engine still refused to start!

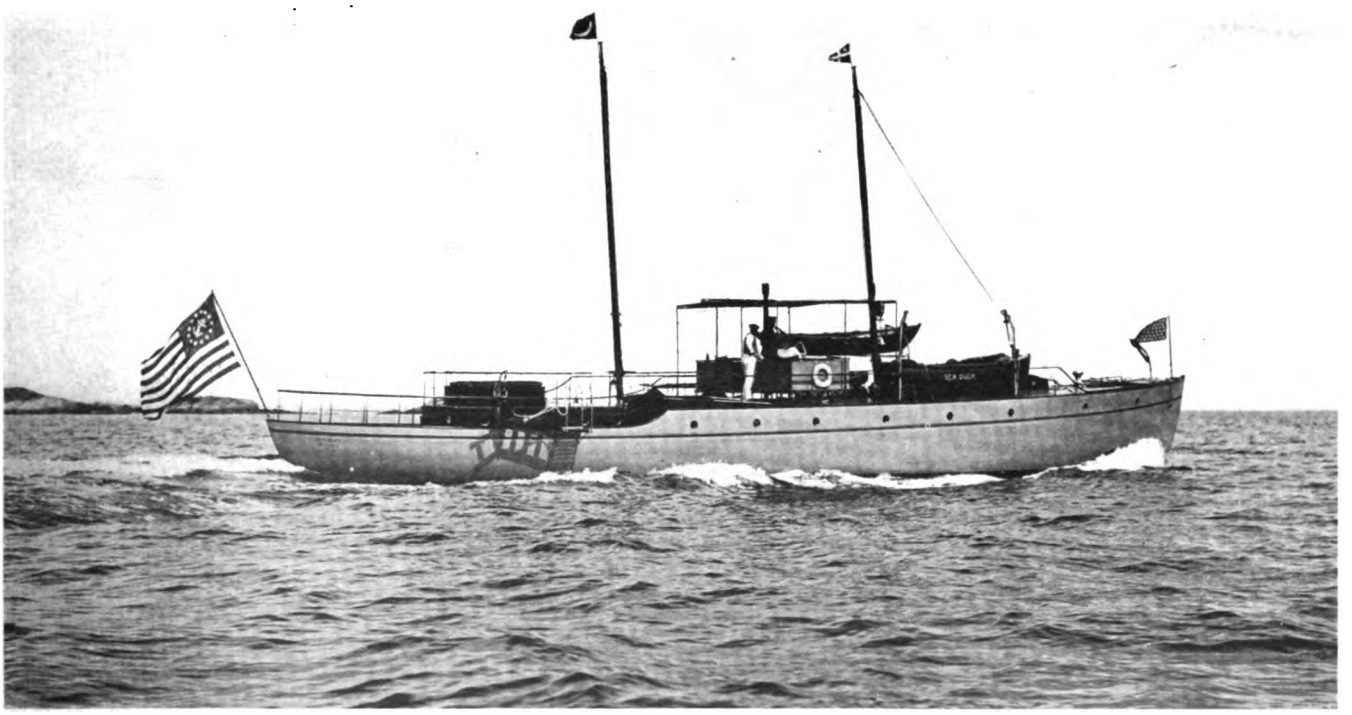
Harold was by this time getting desperate, as it was long past the breakfast hour, and he would soon have to go to business. He filled the oil gun again and yet again, and he and the steward whirled the crank with reckless energy. The idea struck him that perhaps the carbureter was not feeding enough gasolene. He opened the needle valve, first a quarter turn, then another quarter, then a couple of turns more. Still the engine balked; and, by this time exhausted, he flung himself panting on the deck. As he lay with eyes shut, he presently heard the splash of oars. It was Ole, the club boatman, who had rowed out in a skiff to see what the trouble might be. Ole knew a little about engines, and Harold explained the situation. Ole looked at the engine critically, inspected the switch, and turned the crank.

"He ain't got no compression," he announced, beaming triumphantly at having thus solved the problem at a stroke.

Harold jumped up, with a sinking sensation in his breast. In spite of his fatigue, it had in fact seemed to him that the compression was getting weak. Could it be that the valves were leaking so soon? He turned the crank again, this time slowly. Sure enough, there was only the faintest suggestion of compression. Drearily he revolved the prospect of taking out and regrinding eight valves. Eighty would not have seemed more formidable. Then he wiped his hands and put on his coat.

"I'll let those valves wait," he announced. "Afternoon will be soon enough to fix them."

Harold went through the day's duties at the bank with the nervelessness of an automaton. Several times he had to stop and brush the cobwebs from his brain before he was sure whether he was reading correctly the



Sea Duck, 53 Ft. O. A., Two-40-H.P. Murray & Tregurtha Engines, Owned by Charles K. Tyler, Beverly, Mass.

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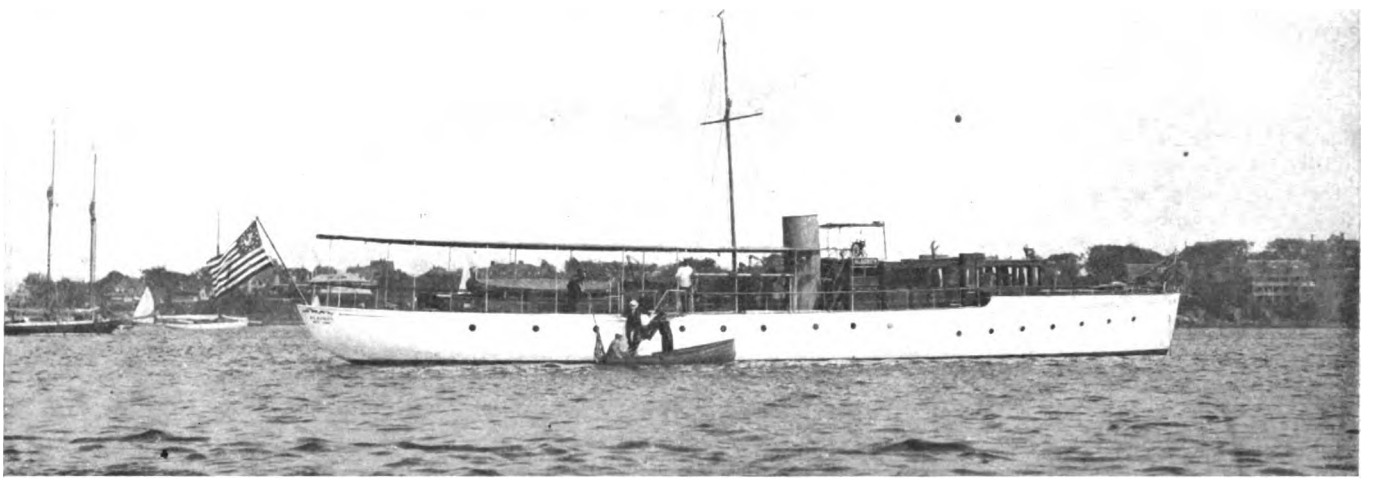


Alacrity, 118 Ft. O. A., 300-H.P. Craig Engine, Owned by W. A. Bradford, New York City

checks proffered him for payment. When four o'clock came, he set out for the yacht club with the feeling of a condemned murderer going to execution. He had promised himself when he bought the boat that he would not ask a minute's help of any one (Ole and the steward did not count). But when, on approaching the club, he caught sight of Jim Bailey, whose boat had an engine of the same make as his, Harold's pride suddenly gave way.

"Jim," he broke out, "I spent three hours this morning trying to start my engine, and I got only one solitary pop in all that time. If you can start it for me I will buy your next tankful of gasolene."

"Well, we'll see about the gasolene," grinned Bailey, with the sympathy of experience. "If I can get you started in half an hour I'll let you off easier."

They rowed out to the boat and Jim looked the situation over, receiving with a face of incredulity the suggestion that probably the valves needed grinding in.

"You ought to run all season without grinding them in," was his comment. However, he turned the crank and conceded the total lack of compression.

"Plugs and gaskets tight?" he asked. The absence of hissing sounds seemed to show that they were. "What did you do this morning?" he asked.

"Well," answered Harold, "the battery seemed to be all right, and the plugs were giving good sparks. So I tried to start her by squirting gasolene into the cylinders."

Bailey grunted and unscrewed one of the plugs. "Who spread these points apart?" he demanded.

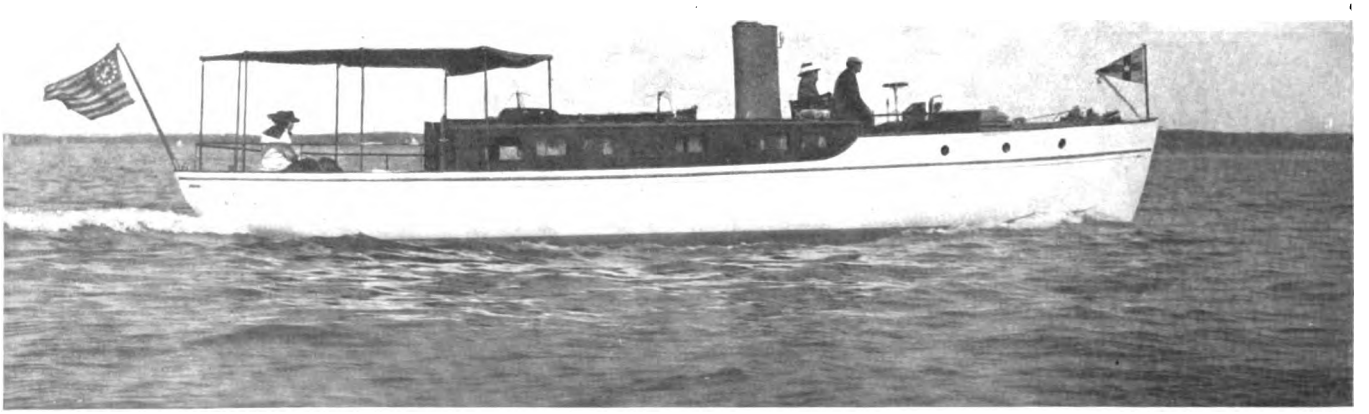
"I did," answered Harold. "I thought it would make a stronger spark."

For an instant his friend seemed to choke. Then he picked up the pliers and bent the points back to their original position. "My boy," he said, gently, "a spark will jump that gap in the open air, but it will not jump it under compression. You were getting no sparks at all after you spread those points."

Harold's face bespoke mingled astonishment and disgust. He kept silence as Bailey removed the other three plugs and treated them in the same manner. Then Jim asked for cylinder oil and an oil gun. He got them and squirted a gunful of oil on top of each of the pistons.

"Feel like cranking a little more?" he asked with a grin. "All right, then, get busy!" When Harold had turned till he was tired Jim took up the task, till at length the pistons were pronounced lubricated and the plugs were screwed in. Harold tried the crank and found to his joy that the compression was all it should be.

Bailey detached a cable from one of the plugs, and,



Octalee IV, 50 Ft. O. A., 30-40-H.P. Murray & Tregurtha Engine, Owned by E. H. Tarbell, Boston, Mass.

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holding it near the cylinder, ascertained that the spark had an open-air length of three-eighths of an inch, which he pronounced sufficient. However, on testing the tremblers with his finger, he slackened back the contact screws, with the remark that the duffer who adjusted them probably wanted to run down the battery as fast as possible in order to sell a fresh battery. Harold heard the sarcasm with conscious guilt, but decided to say nothing. Instead he watched intently while Jim primed the carbureter and threw the crank over.

At last an explosion!—but the engine stopped immediately. Jim primed and tried again with the same result,—a single weak cling or two, but nothing more. After a third try, Jim looked severely at Harold.

"Have you changed the carbureter adjustment?" he asked.

"Yes," confessed that individual, nearly speechless at finding his last attempt at improvement now laid against him. "I opened the needle valve some to give more gasolene."

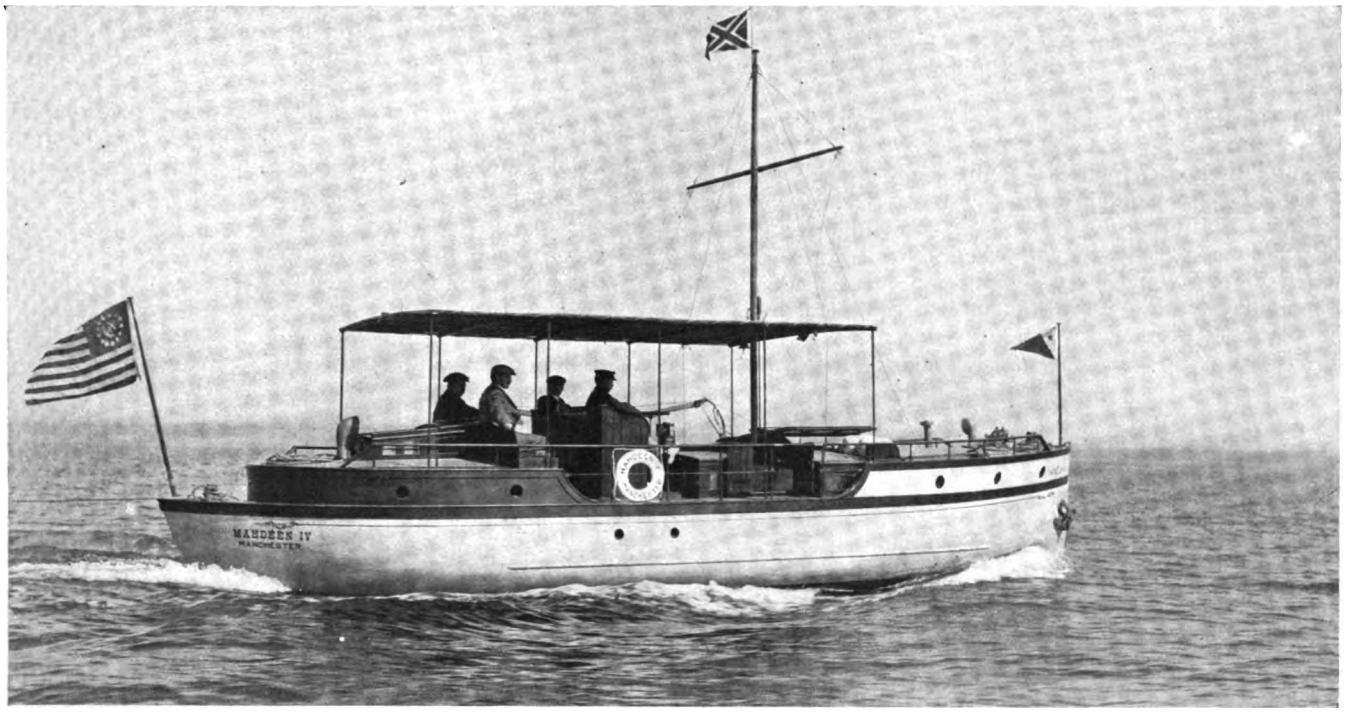
"Now," he said, "I guess she will start. Try her yourself, my boy."

And the engine started and kept going.

* * * * *

"But why didn't the engine start for me?" asked the perplexed Harold, after he had assured himself that he was really awake and that the engine was really running and would start again after the switch was opened. "I can't see that you did a thing except to put things back again the way they were before I changed them."

"Simplest thing in the world, I should say," answered his mentor. "But before I get to it, let me advise you as a friend to dump out all that dilute oil-and-gasolene swill in your crank-case, and put in fresh oil before you run the engine further. Now as to the matter of starting. When you ran Idle Ease these last few afternoons, the air was warm and the gasolene evaporated easily. This morning was cold, and the gasolene didn't vaporize in the carbureter enough to give a mixture on cranking.



Mahdeen IV, 37 Ft. O. A., 30-45-H.P. Sterling Engine, Owned by A. C. Needham, Boston, Mass.

"Thunder!" was the brief but expressive comment of his friend in need. "Do you know how much you opened it?"

Harold didn't know, but guessed it was "a turn or two; maybe more." Bailey said nothing, but grimly took the point of his penknife and made scratches on the needle valve to indicate its existing position. Then he screwed it down, one turn, two turns, three turns.

"Great Scott!" he burst out. "Why didn't you take it clear out while you were about it?"

Another half-turn brought the needle clear down. Fortunate in his previous experience with a similar carbureter, Jim turned it back half a turn, then opened the switch, and turned the crank three or four times to pump out the overrich mixture.

If you had squirted a teaspoonful into each cylinder then and there, without making a single change, the engine would have started at once. You didn't try that till after you had spread the points of the plugs, and then you squirted in entirely too much. The single pop which you obtained was the result of your short-circuiting the timer instead of turning the crank, so that the cylinder in which the spark occurred was not on compression, and therefore the spark was able to jump that ¼-inch gap. You got no sparks in the other cylinders either because they were under compression, or because the gasolene mixed in them was too rich to ignite.

"Let's see—I've been at this job twenty-three minutes. As an expert, I really ought to soak you for that tank of gas, but this time I'll let you off for a cigar."

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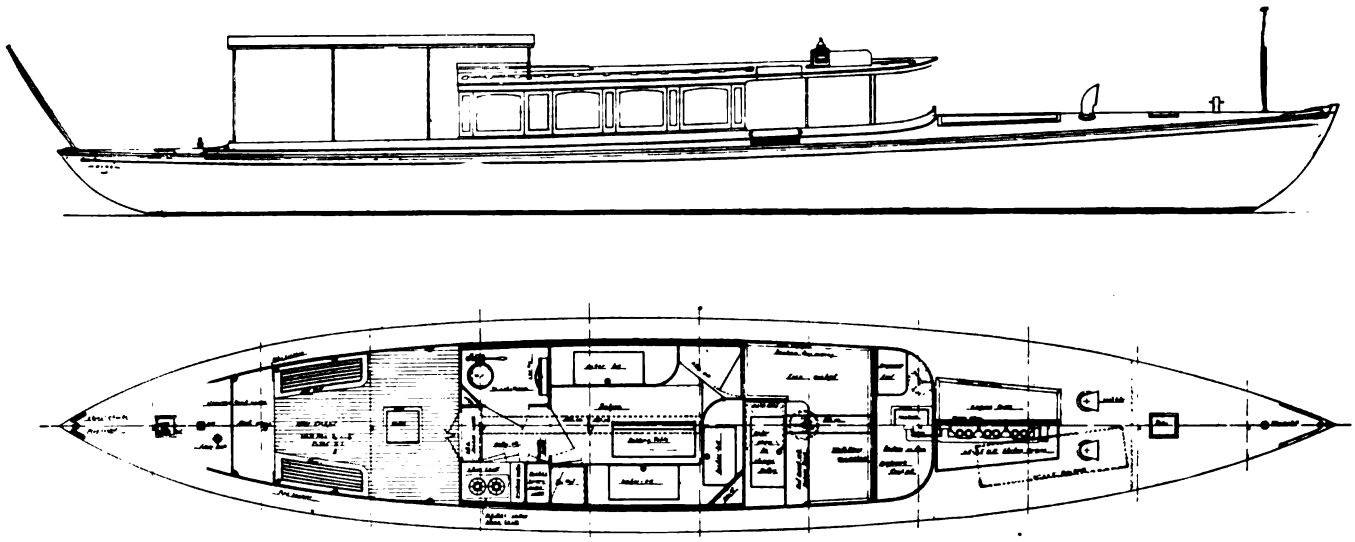


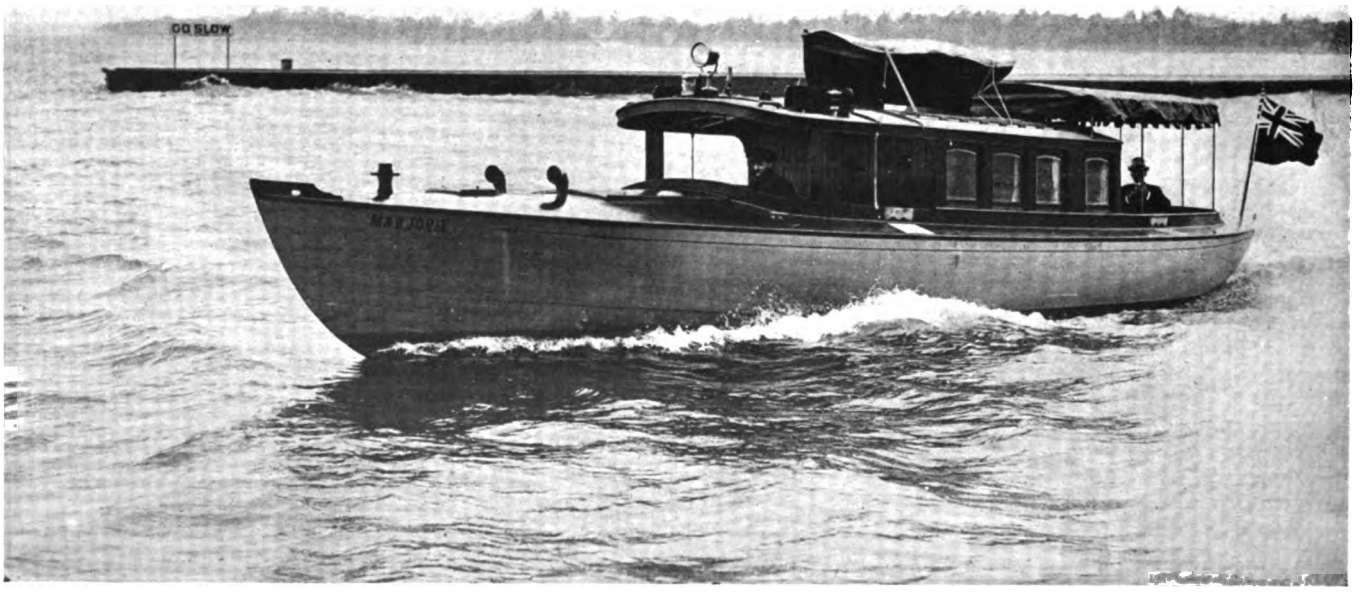
Fifty-Four-Foot Semi-Cruiser. Designed by Roger M. Haddock, New Rochelle, N. Y.

FIFTY-FOUR-FOOT SEMI-CRUISER

THE launch shown in the accompanying plans was designed by Roger M. Haddock and built by the Scofield-Holden Machine Company, of Toronto, Can., for Mr. George Dean of the same city. The designer states that the workmanship and finish of the boat is of the highest class and that no expense or pains were spared to make her an ultra-fine and luxurious semi-cruiser.

It was the intention to produce a craft of strong and fairly light construction, with the engine completely isolated from the owner's accommodation. The frame is of oak, cedar planking with copper fastenings throughout. The plank-sheer is of quartered oak, and the decks of mahogany, as is also the house inside and out. The engine is a six-cylinder, 5½ by 6-inch Sterling, located under a hood forward with the entire control from the fore cockpit. A glass windshield is provided to protect this cockpit, if needed, and the whole space under the canopy top may be enclosed with waterproof curtains when desirable. The speed of the craft is 13½ statute miles per hour, and the general dimensions are as follows:

Length o. a.	54	feet	2½	inches
Length w. l.	46	"	3	"
Breadth, extreme ...	9	"	1½	"
Breadth w. l.	8	"	1½	"
Draught of hull	1	"	5	"
Draught, extreme ...	2	"	8	"



Marjorie, Owned by Mr. George Dean, Toronto, Canada

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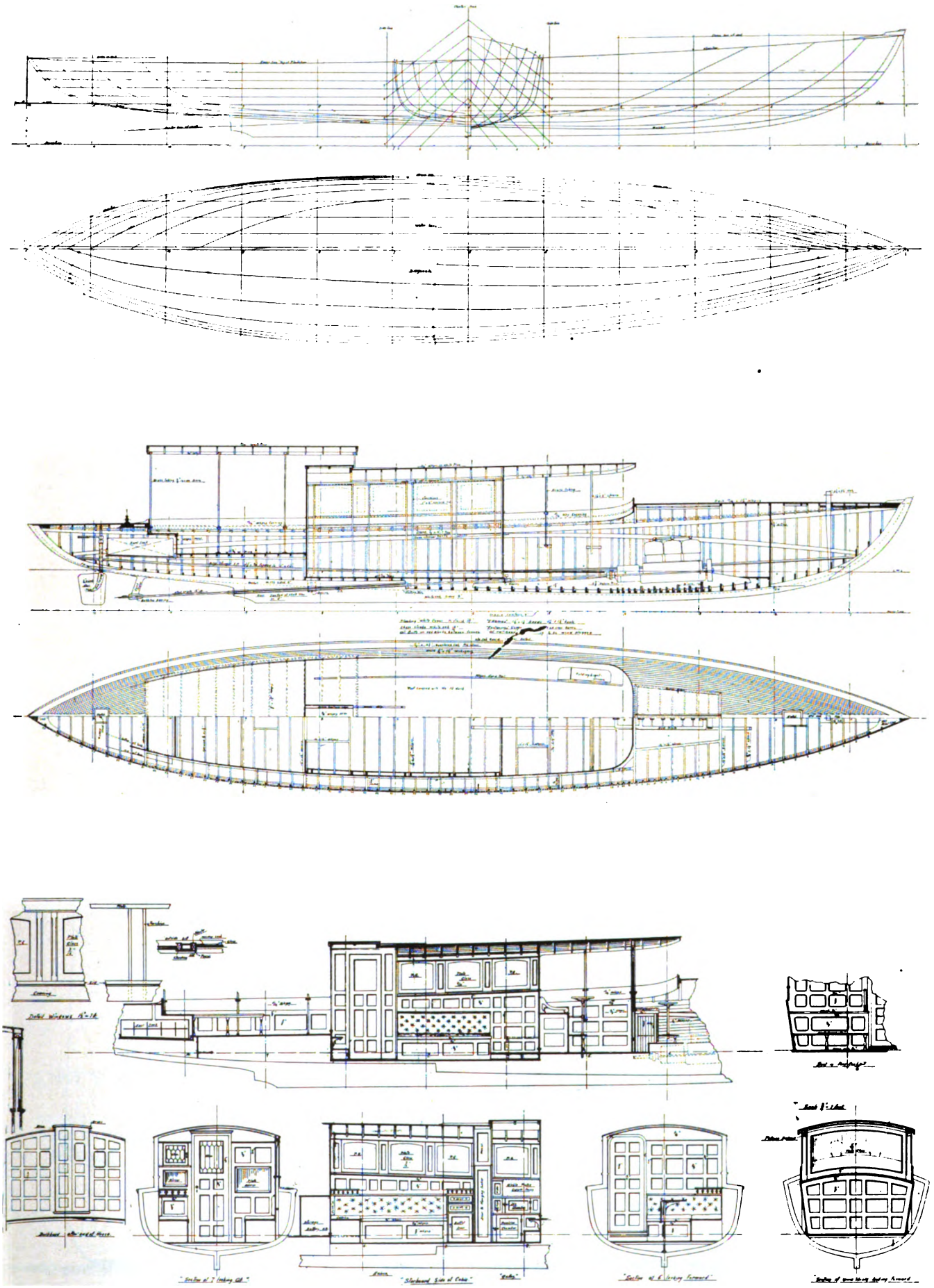

Lines and Construction Plans of Fifty-Four-Foot Semi-Cruiser

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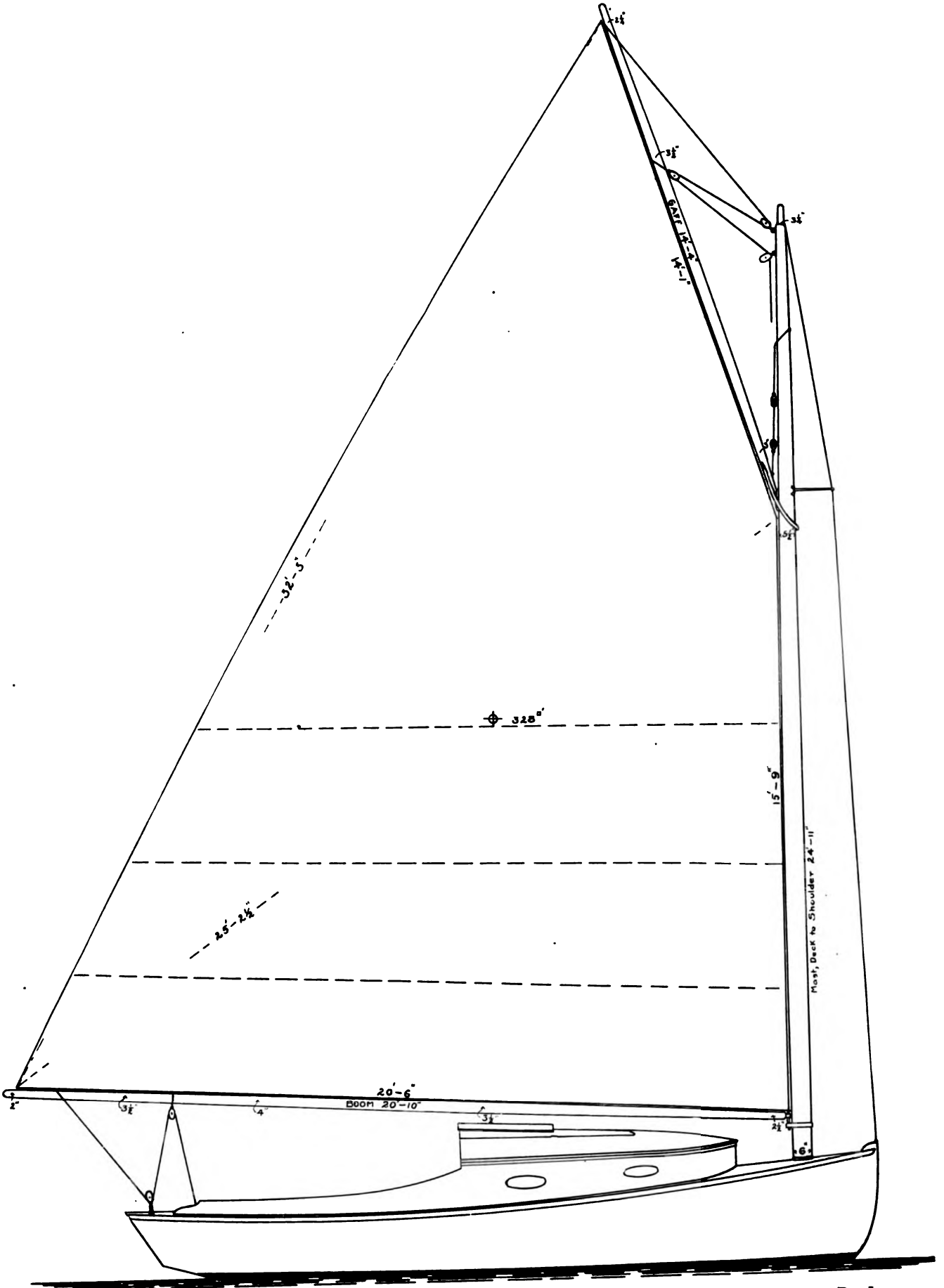

Twenty-Foot Cabin Catboat Designed and Built by Fred S. Nock East Greenwich, R. I.

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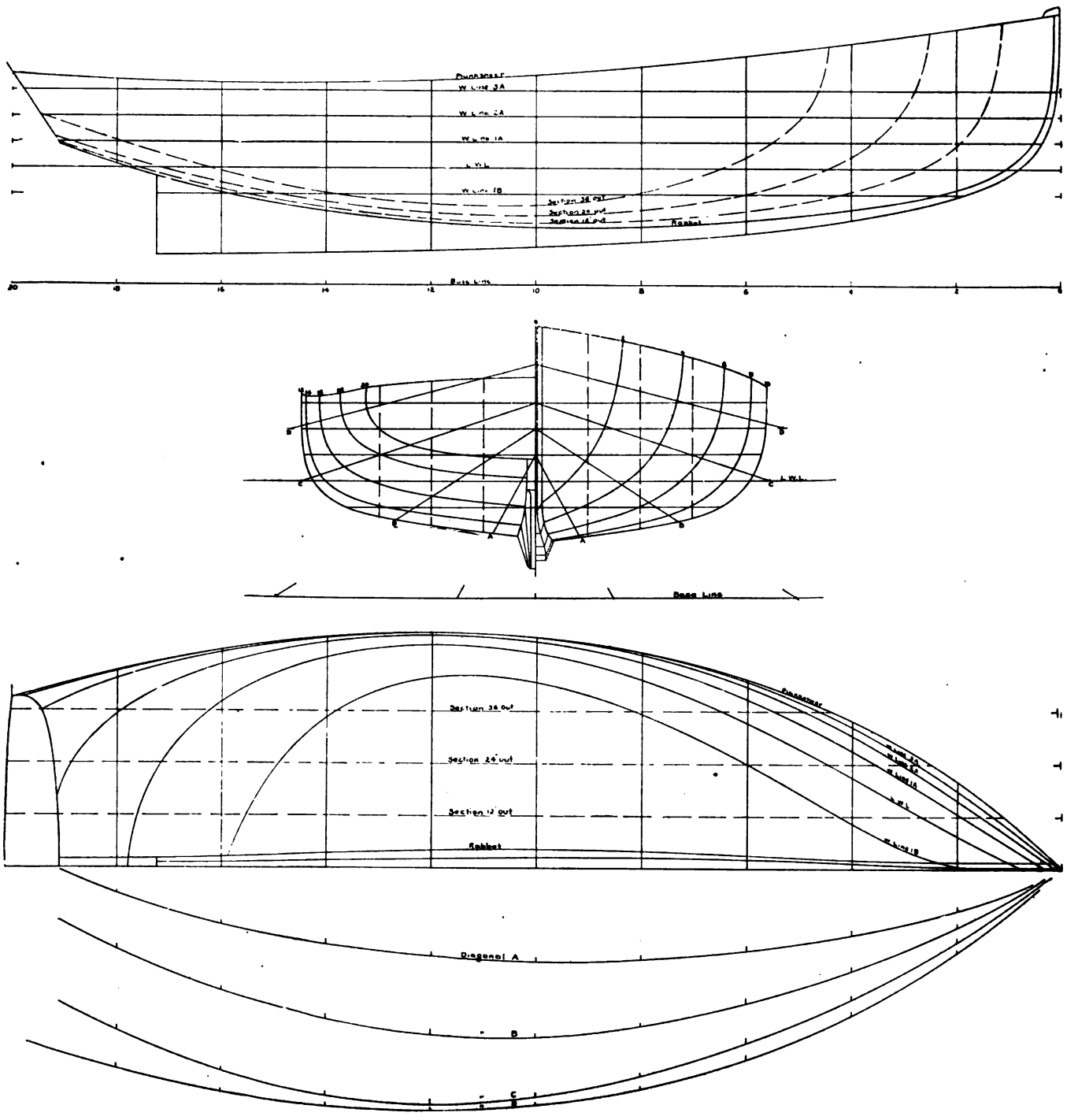

Lines of Twenty-Foot Cabin Catboat

TWENTY-FOOT CABIN CATBOAT

THE boat shown in the accompanying plans was not designed with the idea of having a fast craft, but one in which the owner could spend the day comfortably and if he wanted to, on a pinch, could sleep overnight. The boat was designed and built by F. S. Nock for A. A. Greene.

The construction plan shows a boat of moderately heavy construction, keel sided 11 inches amidship and tapered on underside. The logs of the centerboard case extend beyond the forward head-ledge as far as the step of the mast and are riveted through and through the lower end of the stem, which it connects with the keel. The stem is a natural crook of oak, sided 3 inches and extends clear to the forward head-ledge. The frames are of white oak, steam-bent to shape, 1⅛ inches square, spaced 9 inches on center. Deck beams are of oak sided 1 inch, moulded 1⅞ inches.

The shelf, bilge clamps, etc., are of ample proportion of yellow pine. The cabin trunk sides are of white oak, steam-bent to shape. The bridge deck materially helps in strengthening the boat. The cockpit is water-tight and the deck well above the water-line.

There is nothing radical about the interior arrangements. At the after end of either side is a clothes-press,

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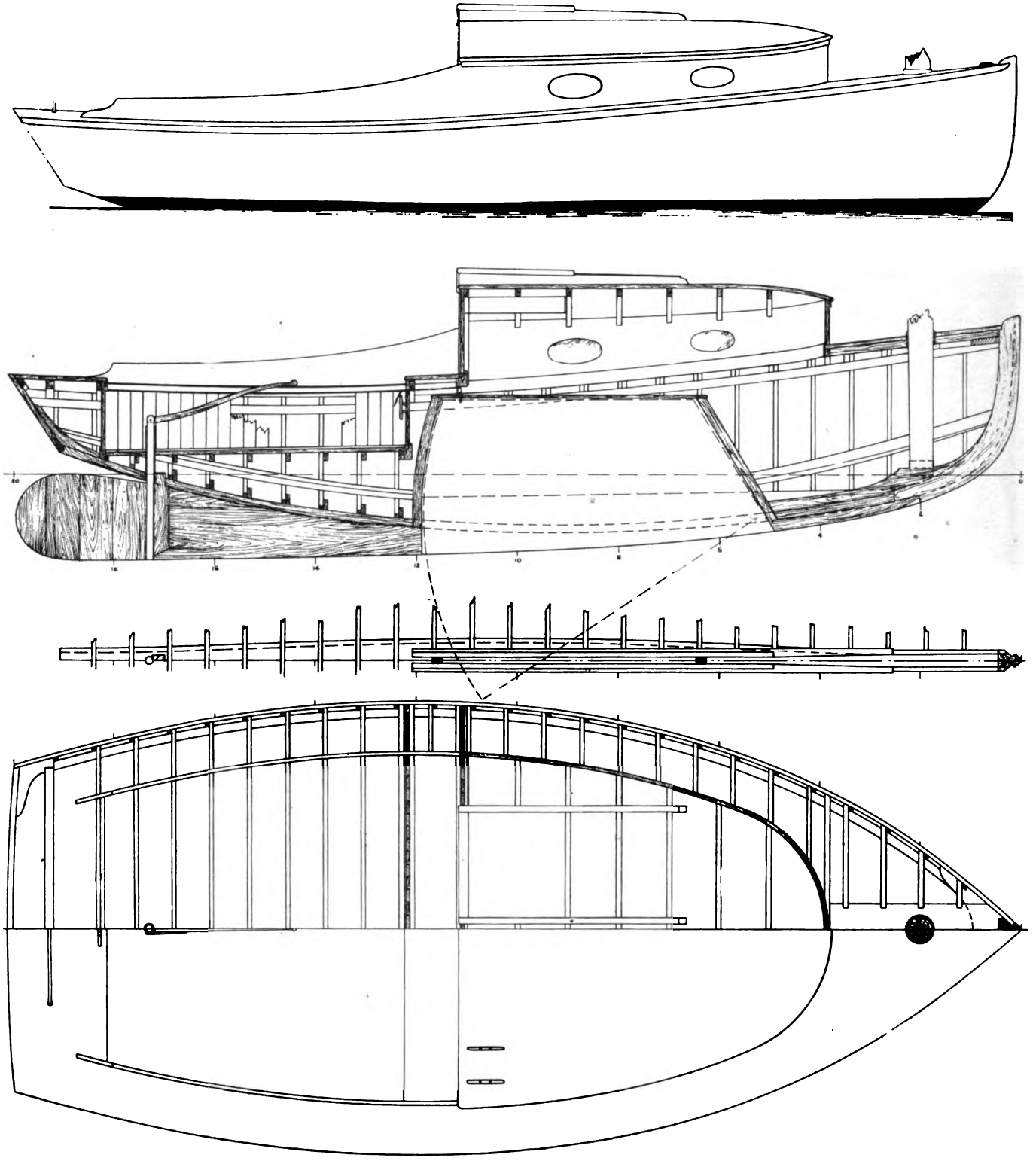

Construction Plans of Twenty-Foot Catboat

on the starboard side under the bridge deck is a stove locker built in, and under the companionway steps under the port side there is a good-sized ice-box.

General dimensions:

Length o. a.	20	feet	0	inches
Length w. l.	17	"	0	"
Breadth, extreme	9	"	0	"
Breadth w. l.	8	"	6	"
Draught to keel bottom	1	foot	8¼	inches
Draught to rabbet	1	"	1½	"
Freeboard at stem	3	"	0	"
Freeboard at taffrail	2	"	0	"
Freeboard, least	1	"	8	"
Headroom in cabin	4	"	5	"
Length of cockpit	7	"	0	"
Sail area	328	square	feet	

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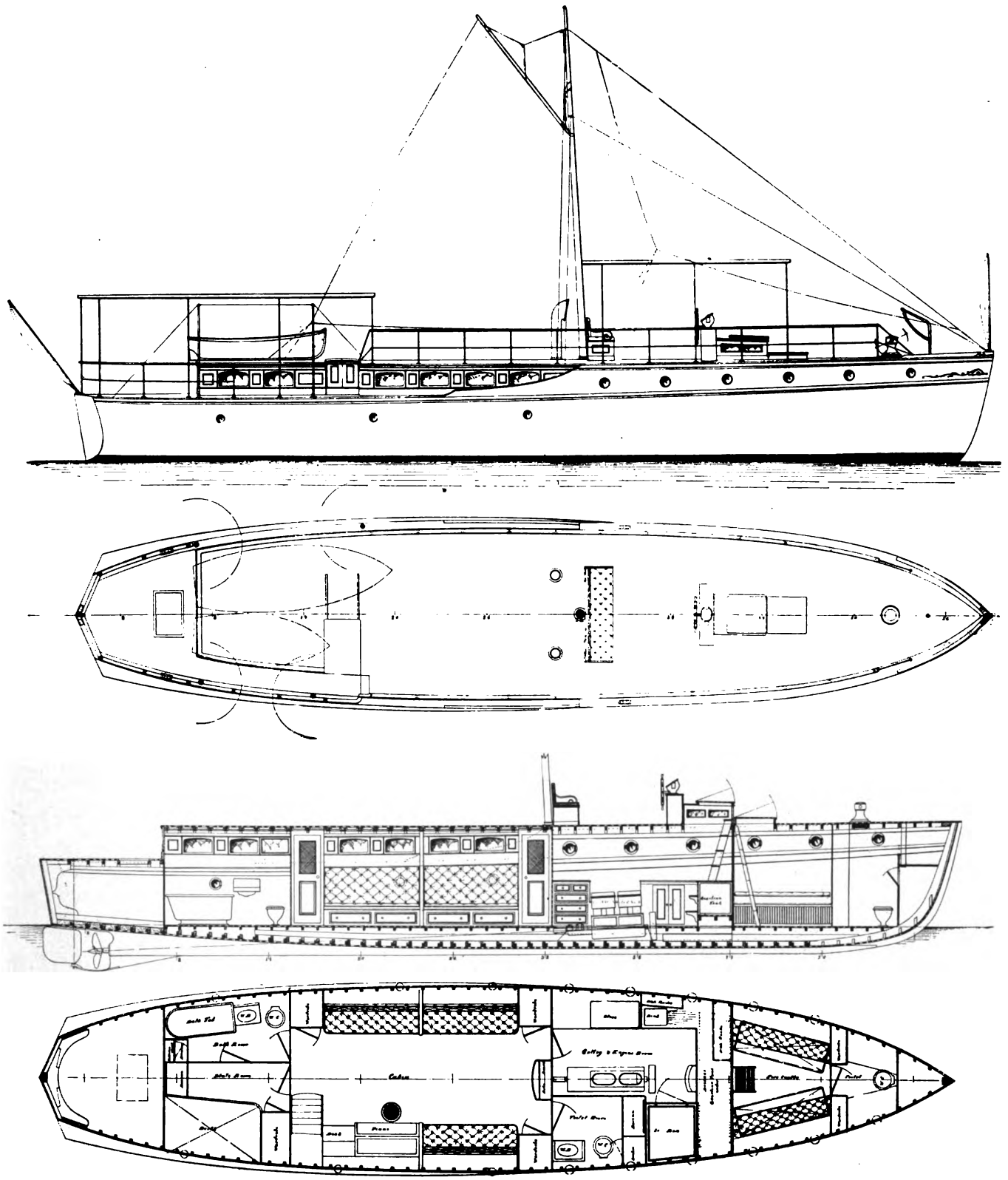

Sixty-Foot Southern Cruiser. Designed by Cox & Stevens for Mr. R. E. Olds, Lansing, Mich.

SOUTHERN CRUISER

THE Messrs. Cox & Stevens have designed for Mr. R. E. Olds, of Lansing, Mich., a 60-foot power boat which is to be used entirely in Southern waters, and is now nearing completion at the New York Yacht and Engine Company's yard.

This vessel is of the raised deck type, having a trunk cabin over the living quarters, which has been found practically a necessity in the South. She has a slightly raking stem, and a V transom aft, this form of afterbody making possible the greatest amount of accommodation in the given over-all length, which in this case the

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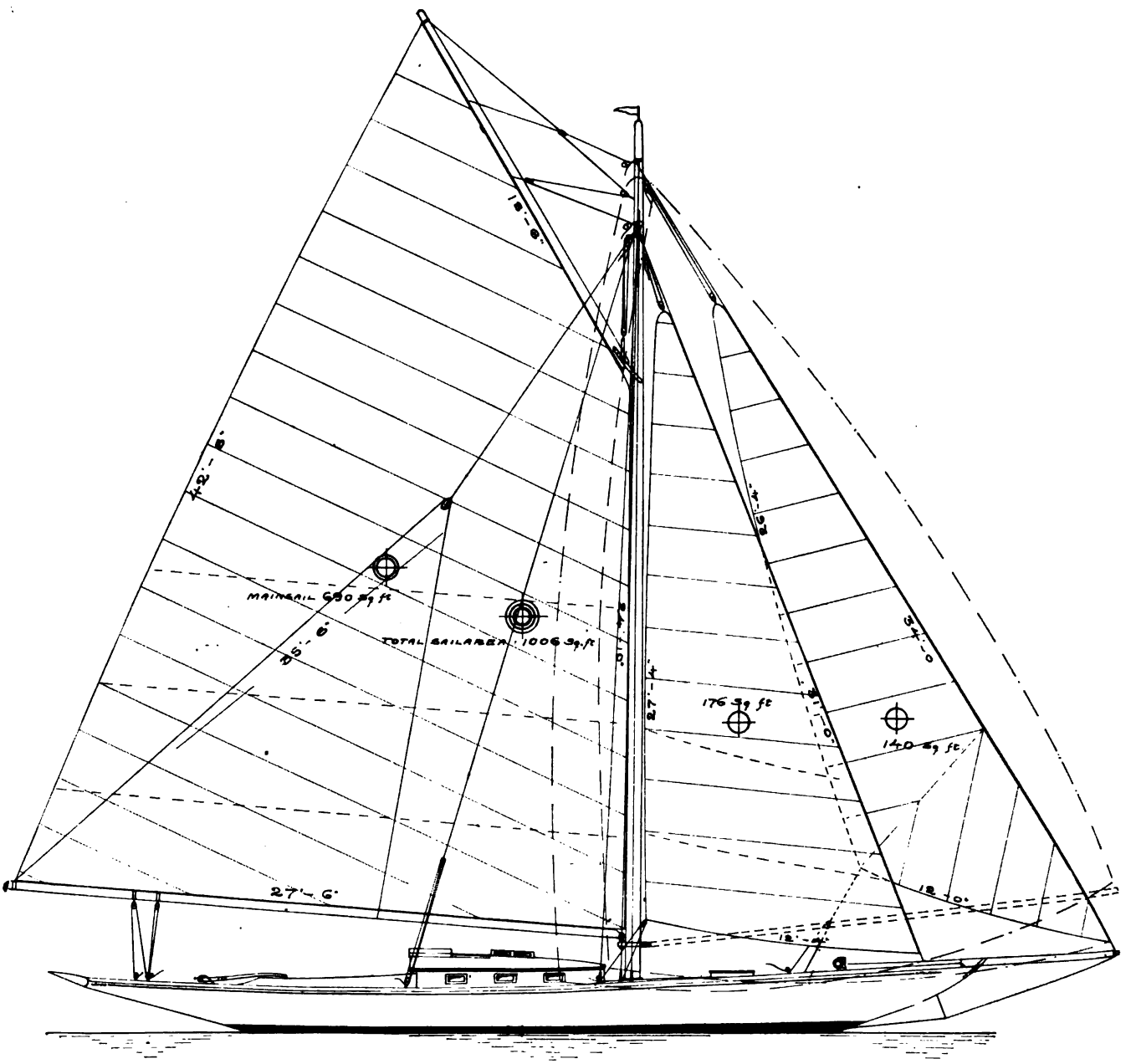
owner wishes to limit to 60 feet. The breadth of this craft is 12 feet 6 inches, and her draught 2 feet 9 inches, which will enable her to go into the shallow Southern harbors. The engine is situated slightly forward of the center of the vessel, and is a 24-h.p. Twentieth-Century engine of the latest type. In order to economize space it was decided to have the galley and engine room one compartment, which contains a large refrigerator, sink, range, dresser, dish-racks, etc.; also gasolene tanks of a total capacity of 250 gallons. Forward of this compartment comes the forecastle, having accommodation for the crew and their own toilet and washroom.

Aft of the engine space is a large saloon, the full width of the vessel, and containing on the port side two Pullman berths, which, when folded, become comfortable sofas, also two large hanging lockers, while on the starboard side there is one Pullman berth of the same type, and companionway to the upper deck. This room will be used as a dining room, and on account of its large dimensions will be comfortable. Opening off the saloon, at the after end, is a single stateroom, having a built-in berth, wardrobe and bureau, and communicating with a bathroom on the port side, all of which will be tiled, this room containing bathtub, wash basin and toilet.

The craft will have one polemast, on which sail may be set, if desired, and her deck space will be completely covered with awning. She will have a thwartship seat on deck, and, as the cabin trunk extends practically out to the side of the vessel, she is in reality flush deck from stem to stern, giving a great deal of free deck room, and at the same time making it possible to have windows in the saloon and stateroom, as already noted.



International Rule Sloop. Designed by C. Theiste, Trondhjem, Norway

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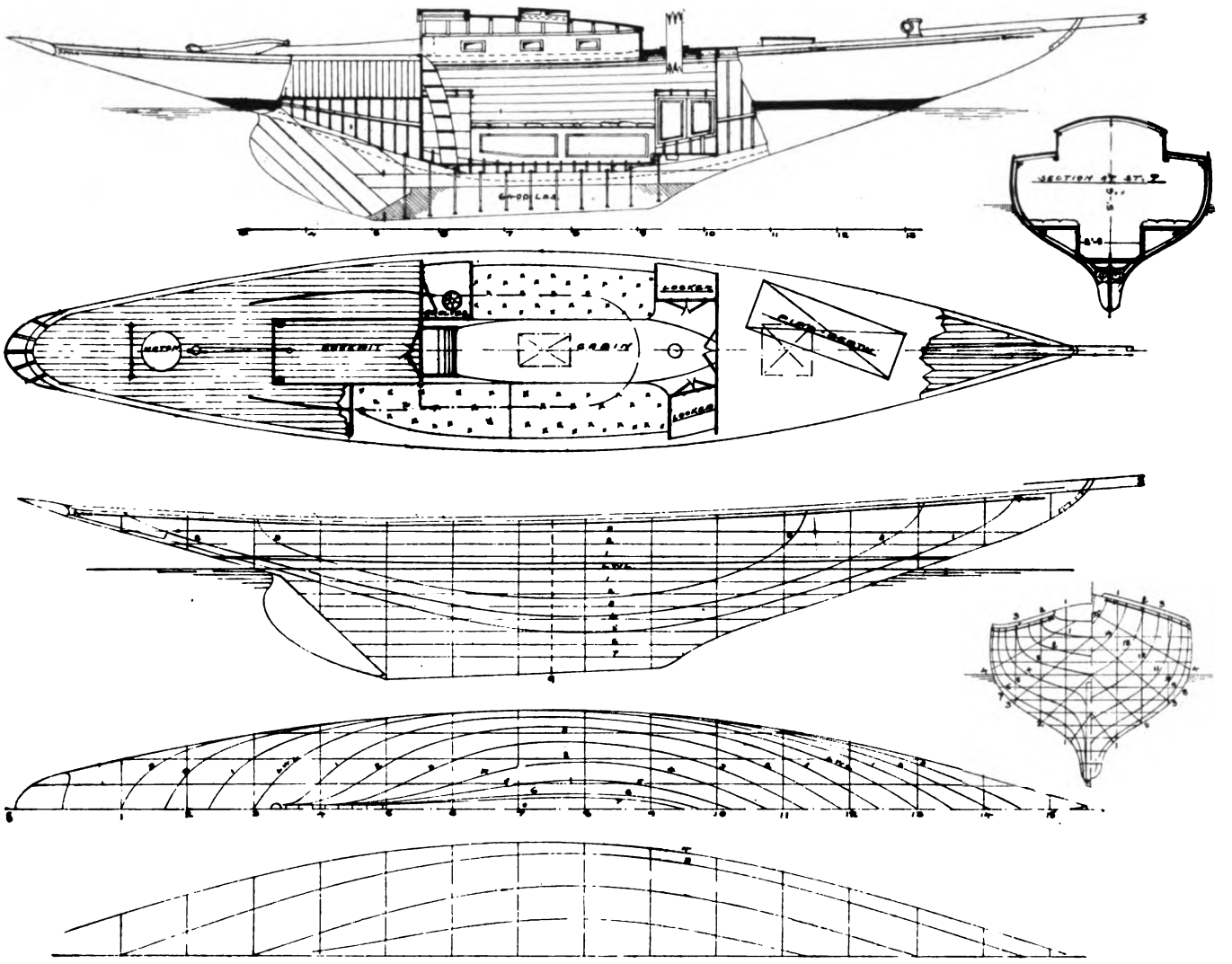

Cabin Plan and Lines of International Rule Sloop

INTERNATIONAL RULE SLOOP

THE designer of the sloop shown in the accompanying plan, Mr. C. Theiste, of Trondhjem, Norway, writes that he designed the craft under the International Rule for the 8-metre class. The above-water appearance of the craft is very similar to our boats on this side of the pond, but the underbody provides an interesting study. The scantlings of the boat are as follows:

Keel oak moulded 6 inches; stern sided 4 inches, moulded 5½ inches; bent oak frames 1¾ inches by 1¾ inches at heel and 1¾ inches by 1¼ inches at top; planking 1-inch mahogany; deck beams oak 2¼ inches by 1½ inches, tapered to 1½ inches by 1½ inches at ends; deck 1-inch white pine. Dimensions are as follows:

Length o. a.	41	feet	11	inches
Length w. l.	26	"	2	"
Breadth	8	"	0	"
Draught	4	"	4	"
Freeboard, least	1	"	10½	"
Freeboard, stem	3	"	1½	"
Freeboard, stern	2	"	4	"

ST. LAWRENCE RIVER DAY BOAT

THE 55-footer shown on page 252 was designed by Morris M. Whitaker, for use as a day cruiser on the St. Lawrence River, where the type is used for trips about the islands and usually housed in a houseboat.

This boat will be equipped with a 60-h.p. heavy-duty Sterling engine, which the designer states should drive her at a speed of better than 14 miles per hour despite her breadth of 10 feet.

The whole after part of the boat is given up to a big cockpit, covered by awnings, fitted with a seat at the after end and chairs. On each side of the cockpit forward is a step leading up to the deck, which at this point and on the bridge is run at the height of the main sheer moulding. The engine is under the house amidship, with stack ventilation and large windows on each side. The engine room contains berths for two men, toilet and electric light outfit. The forward end of the house has a step on to the bridge and the boat is steered from this bridge. Entrance to the main owner's quarters is from this bridge and consists of one large room with transoms on each side and buffets at the forward end, under one of which is a stove and sink, entirely concealed when not in use. Under the other is an ice-box and back of both are glass lockers. Under the bridge athwartship is a berth of fairly good width, fitted with electric light

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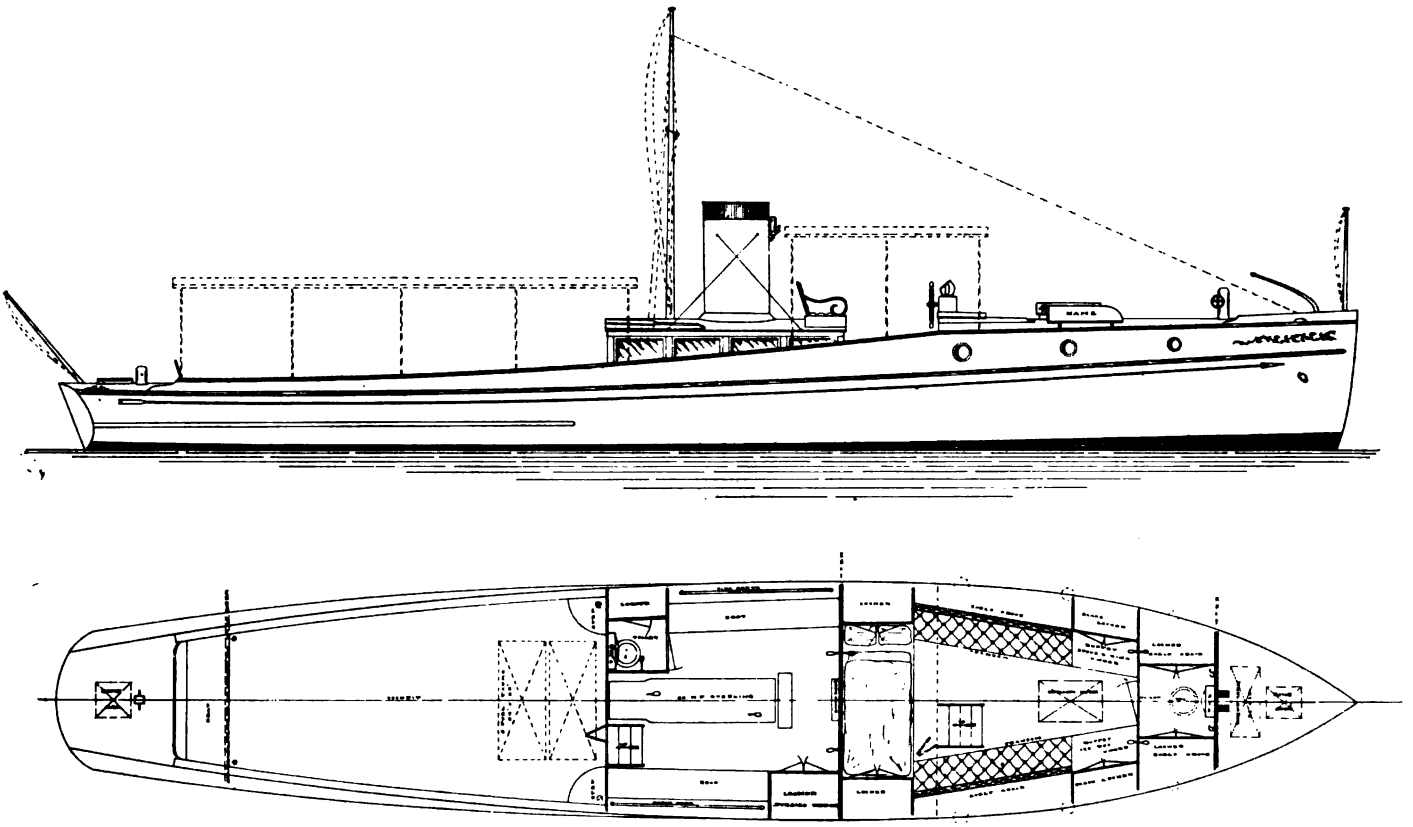
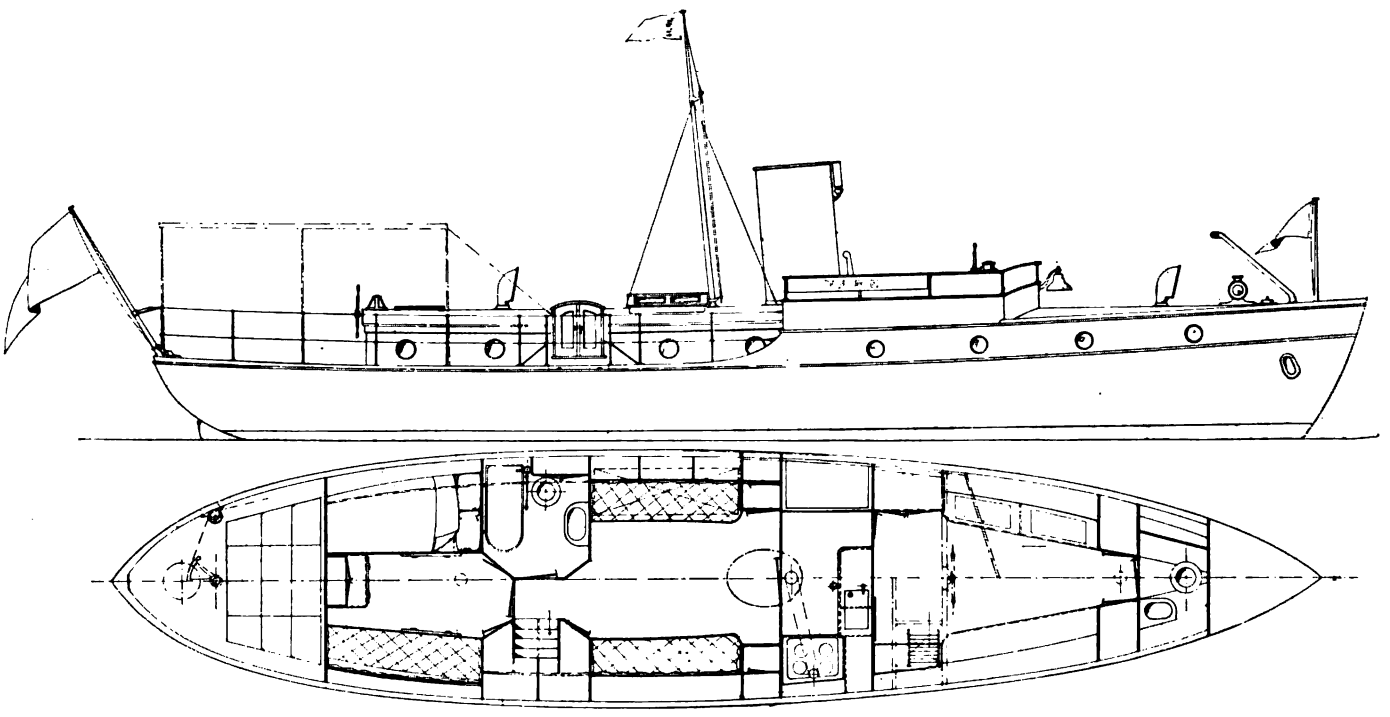


Fifty-Five-Foot St. Lawrence River Day Cruiser. Designed by Morris M. Whitaker

for night reading. At the forward end of this cabin is the owner's toilet, with lockers and shelves over on each side.

The general design of this boat is such as will admit of good speed, and the raised deck forward gives a degree of seaworthiness which will prove useful should the owner desire to make an extended trip to Lake Ontario, which is practically only a stone's throw from the thickly populated part of the St. Lawrence River. The form of the hull has a wide flaring bow, V sections, which give good seaworthiness, and a roll in to the sides aft for the sake of appearance. The boat is being built by the Leyare Boat Works of Ogdensburg, N. Y., for Mr. Chas. H. Remington, of Watertown, N. Y.



Fifty-One-Foot Power Cruiser. Designed by Swasey, Raymond & Page for Mr. C. W. Clifford, Bath, Me.

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FIFTY-ONE-FOOT POWER CRUISER

THE 51-footer shown opposite was designed by Swasey, Raymond & Page, for C. W. Clifford, of Bath, Me., as an ocean-going power cruiser. She is of a type developed by the designers and has proven a successful class of boat for coast service.

Her accommodation is laid out as follows: Forward is the forecastle for the accommodation of two men, at the after end of which is the engine room with ample locker and stowage space. Directly aft of this is the athwartship galley with the usual fittings; aft of the galley is the main cabin with companionway on the starboard side, opposite to which is the owner's bathroom, and in the stern is located the owner's quarters.

The machinery consists of a 25-h.p. four-cylinder Standard engine, which the designers state drives the boat in the neighborhood of 11 miles per hour. The general dimensions are as follows:

Length o. a.	51	feet	0	inches
Breadth	10	"	9	"
Draught	3	"	6	"

KATHMAR

DESIGNED principally for a day boat, the accompanying plan depicts a 40-foot cruiser of an extremely sturdy and seaworthy type that will give an excellent account of herself in both smooth and broken waters.

It will be noticed that the bow is very high, fully as much freeboard as found on the usual type of raised deck cruiser; this taken in conjunction with the liberal flare produces an extremely dry boat.

The unique feature of the craft is the arrangement of the owner's quarters aft in the most comfortable portion of the boat, isolated from the engine and crew's space. In this cabin there will be accommodation on the extension transom, extending under the after deck, for four people. The crew of one will be berthed forward in the engine room.

Main cabin will be furnished with a drop-leaf mahogany table; the finish of the room is to be white enamel rubbed to an eggshell finish with mahogany beams and trim. There will be mirrors built in on each side of the forward bulkhead. The vestibule and galley are finished in solid African mahogany, eggshell finish. The ice-box is to have a capacity of 150 lb of ice and has a large food compartment under. The toilet room, finished in white, is fitted with Sands' plumbing fixtures including an open porcelain basin.

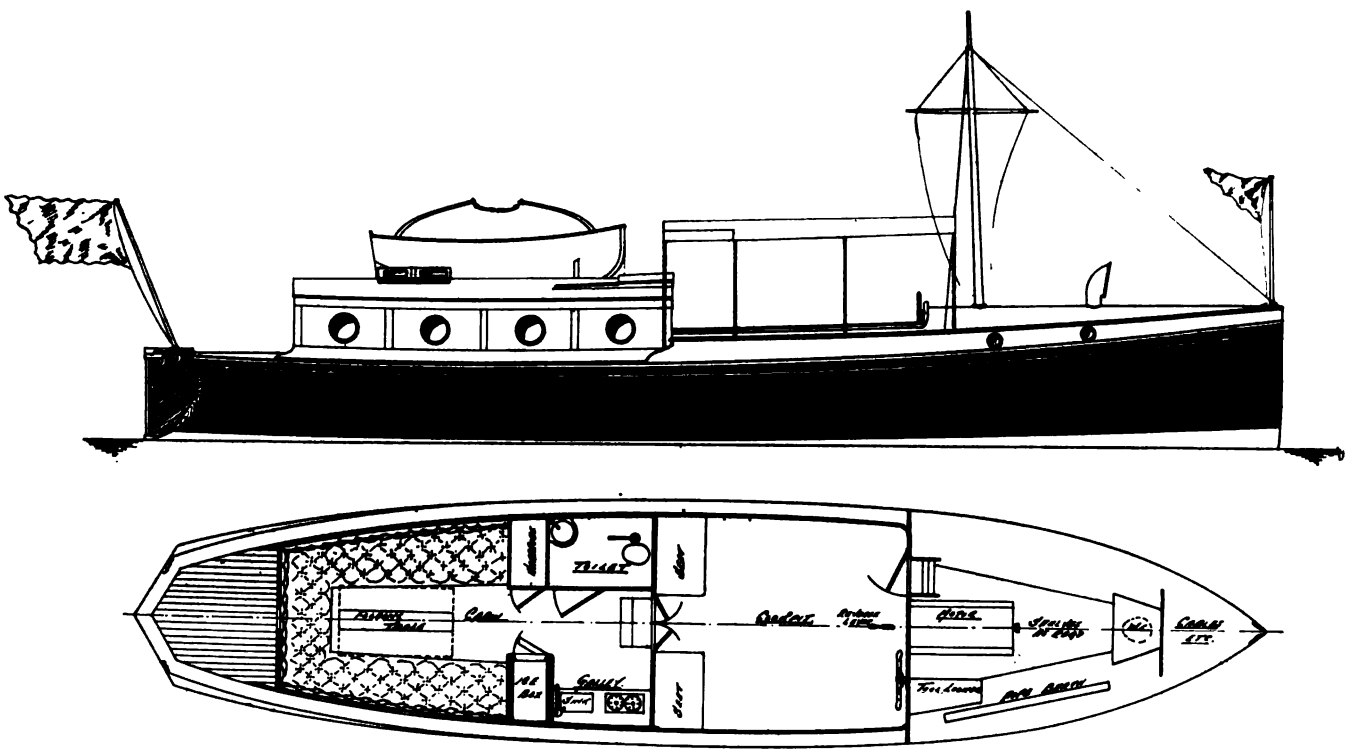
The engine, a 60-h.p. four-cylinder 6 by 6½-inch Trebert, is installed forward but sufficiently far aft that it will not prevent the boat rising sharply to a sea. A generator for charging the storage batteries will be driven by belt from the main engines. With the engine developing about 50-h.p. a speed of 14½ miles per hour was guaranteed. Eleven Tungsten lamps and fixtures will be installed for illuminating the interior.

A 9-foot mahogany and cedar tender will be carried on davits as shown.

Forty gallons of fresh water will be carried under the water-tight self-bailing cockpit floor. The gasolene tanks of a capacity of 90 gallons will be located in copper pans under the seats and will have drains running overboard.

The hull of this boat is planked with long lengths of Virginia white cedar, 1 inch thick. The keel is in a single length of white oak. Ribs, stem, knees and general framing are all of selected oak. The exterior of the house is mahogany finished in the natural color with large, spaciously designed air-ports. All metal work, rudder, cleats, etc., will be of manganese or Tobin bronze.

This general style of boat, especially the arrangement, is one that has been developed by this concern, Mr.



Kathmar, Forty-Feet O. A. Designed and Built by Luders Marine Construction Co. for Mr. Robert T Fowler

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Luders, the designer, having been the first one in this country to advocate and take advantage of the possibilities of this type and design boats along these lines.

Kathmar, the name of the craft, was designed and built by the Luders Marine Construction Company, of Port Chester, N. Y., for Mr. Robert T. Fowler, for use on Long Island Sound and adjacent waters.

General dimensions are as follows:

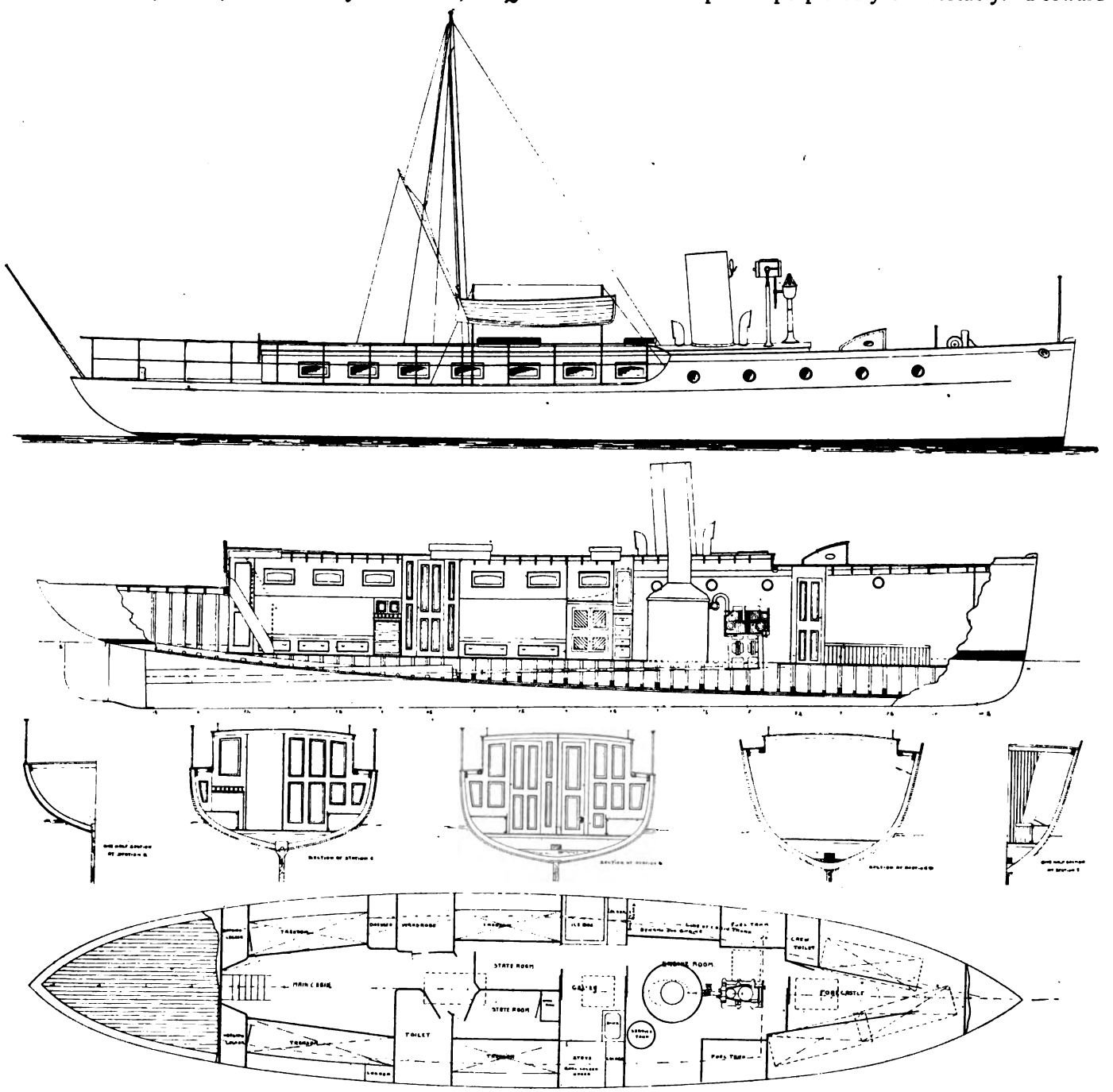
Length o. a.	40	feet	0	inches
Breadth	9	"	0	"
Draught	2	"	6	"

STEAM YACHT ALCESTIS

ALCESTIS was designed and built by Stearns & McKay, of Marblehead, Mass., for Mr. F. J. Cockburn, of Quebec, Can. She is interesting in that she was built in the United States for a Canadian and equipped with machinery that was imported from England. She is 65 feet over all and equipped with a 70-h.p. quadruple expansion steam engine and boiler of the liquid fuel type. She carries 1,200 gallons of fuel and has a cruising radius of approximately 1,000 miles. The machinery was specially constructed for the yacht by the Lune Valley Engineering Company, of Lancaster, Eng., and drives the craft at a speed of 10 nautical miles per hour.

The construction of the hull is extremely strong, and special attention was paid to seaworthy qualities, as the yacht will be required to cruise up the coast of Labrador.

Below deck she has a large and very comfortable main cabin, entered directly from the quarter-deck. This cabin will sleep four people very comfortably. Forward



Sixty-Five-Foot S. Y. Alcestis. Designed and Built by Stearns & McKay, Marblehead, Mass.

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of the cabin is a large toilet room, two wardrobes and two large staterooms, and forward of these is a separate galley to provide the utmost convenience for good clean cooking and kitchen work.

The engine room is large and very thoroughly ventilated; forward of that is an unusually large and comfortable forecastle.

The yacht is equipped with every convenience for extended cruising. She is electric lighted throughout and has a powerful searchlight. The electric lighting plant consists of a storage battery system and generator, operated by a 1½-h.p. donkey engine. A complete hot and cold-water system is also provided for.

Her general dimensions are as follows:

Length o. a.	65	feet	0	inches
Length w. l.	60	"	0	"
Breadth, extreme	12	"	9	"
Draught under propeller	4	"	6	"

SOUTHERN CRUISER

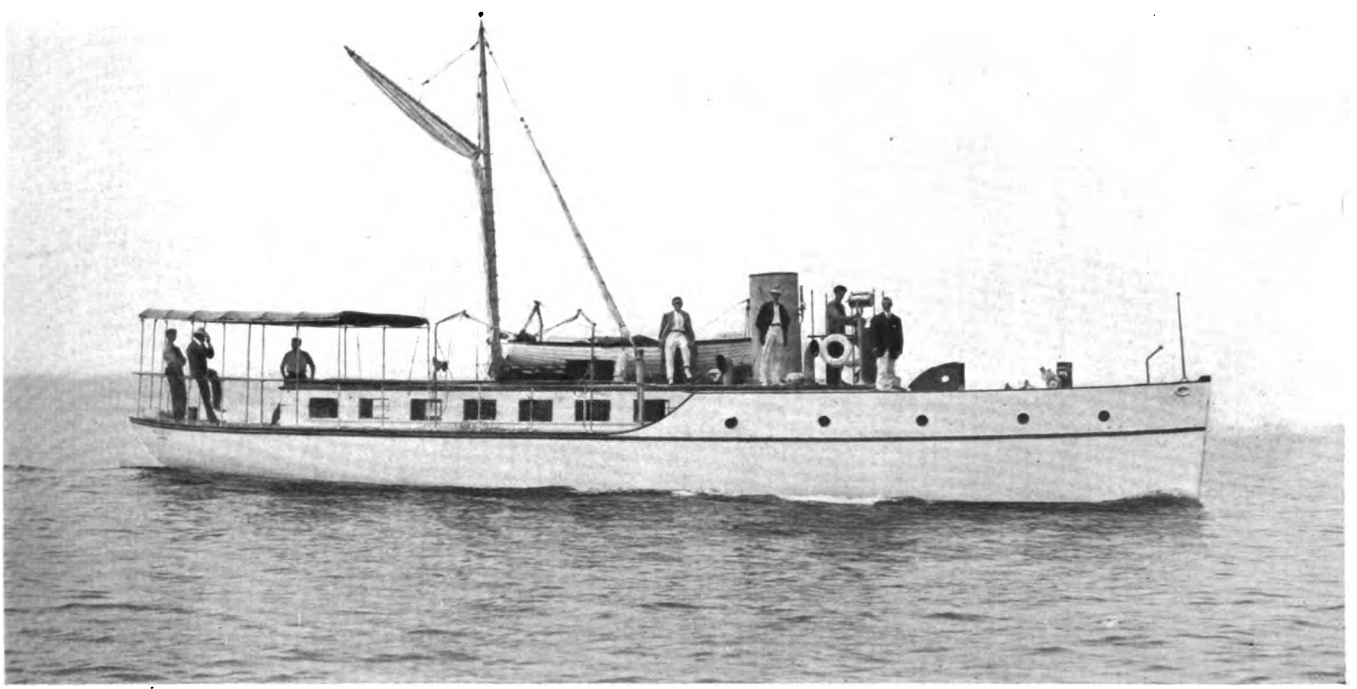
THE New York Launch and Engine Company of Morris Heights, N. Y., are building from the plans of Messrs. Cox & Stevens for Mr. Merrill B. Mills, of Detroit, Mich, the 110-foot power cruiser shown in the accompanying drawings.

The plans show a full-bodied, able vessel, with canoe bow and stern, good breadth, ample freeboard and flush deck, giving her an unusual amount of free deck space. In general appearance the craft is pleasing, there being a large stack amidships, through which the engines exhaust, which, with a large deckhouse and two polemasts, gives the vessel considerable dignity.

The principal dimensions of this boat are: Length over all 110 feet; breadth 20 feet; draught 4 feet. The motive power consists of two 100-h.p. Twentieth-Century engines, situated in a compartment in the middle of the vessel, which is entirely separated from the rest of the ship by water-tight bulkheads. These engines, as before stated, exhaust through the stack, and the engine compartment contains, in addition to the propelling machinery, a large independent electric light plant; also a large bilge pump, driven off the main engines, which is used for wash deck purposes. The gasolene supply is considerable—1,500 gallons being contained in copper tanks, which are of unusually heavy construction, and in a compartment by themselves for the purpose of safety.

The owner's quarters are in the after part of the vessel, and by an ingenious arrangement he has access to the deckhouse from below, so that in bad weather it is not necessary to go on deck in order to get into the dining saloon. The quarters are remarkably commodious for a craft of this size, and consist, in the after part of the vessel, of a double stateroom, full width of the boat, with large skylight over same, and having four air-ports. This room has a double bed, bureau with plate-glass mirror, large wardrobe and hanging locker, and connects directly with a bathroom in the starboard side of the ship, having a 6-foot bathtub, lavatory and toilet, all supplied with running water, the floor of this bathroom being tiled.

The entrance to the after accommodations is by means of a companionway in the middle of the vessel, which lands below abreast the bathroom, in a passage which also opens into the after stateroom. On the port side of this companionway and opposite the bathroom just mentioned is a comfortable stateroom having a double bed, bureau and wardrobe, with a door opening into the hall. Forward of this room, on the port side is another guest's stateroom, with built-in berth and drawers under same, bureau, wardrobe and hanging locker, this room opening into the passageway and also



S. Y. Alcestis. Owned by Mr. F. J. Cockburn of Quebec, Canada

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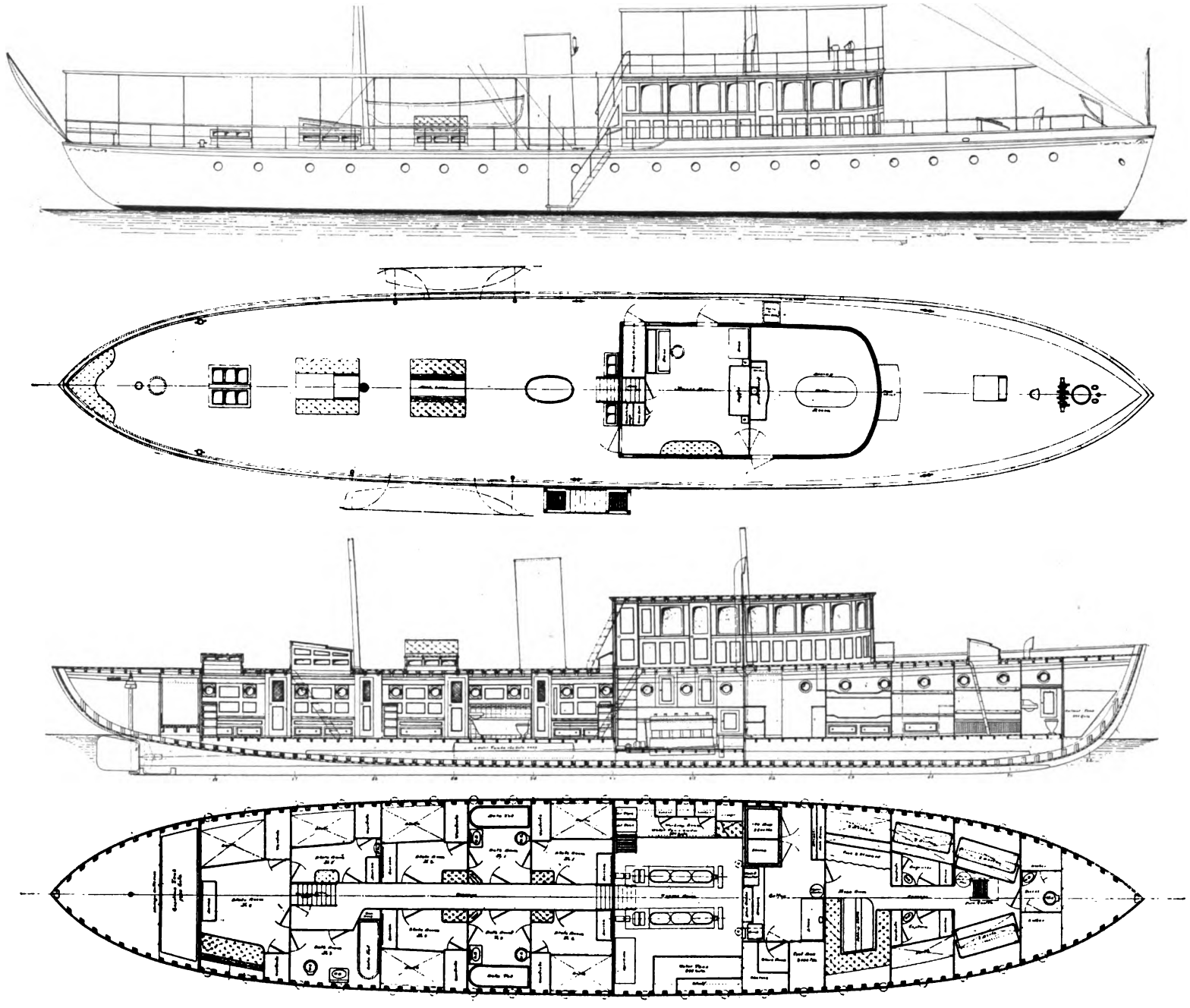

One-Hundred-and-Ten-Foot Southern Cruiser Designed by Cox & Stevens for Mr Merrill B Mills of Detroit Mich

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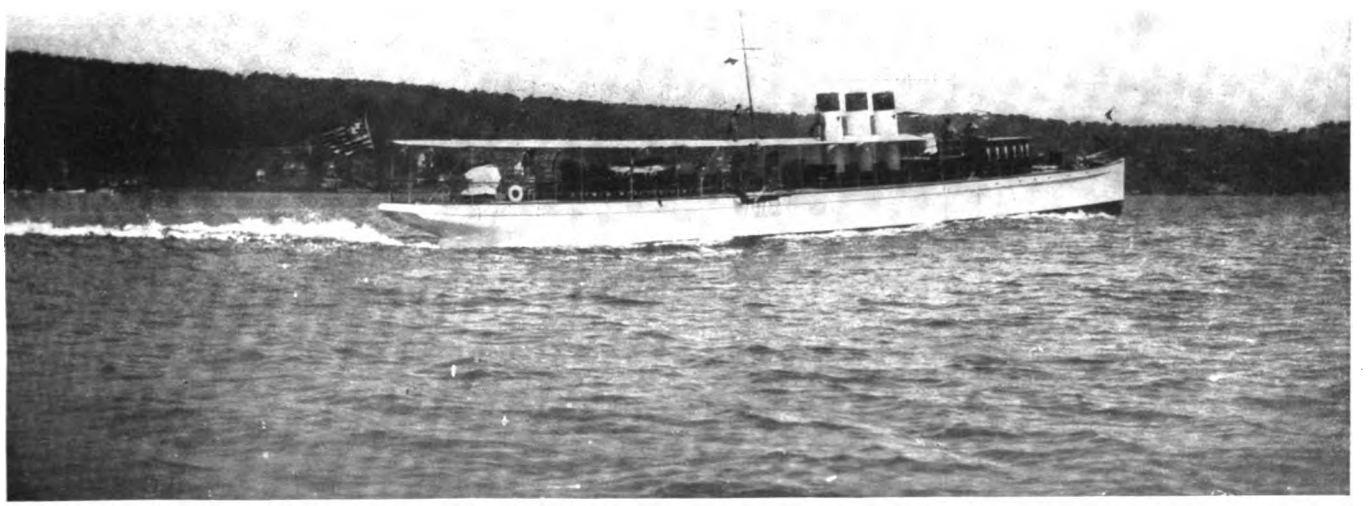
communicating with a bathroom on the port side of the vessel, which is fitted with tub, lavatory and toilet, the floor of this room also being tiled. On the port side forward of this bath, also connecting with it, and with the passage, is still another guest's stateroom, similar to the one just described, and on the starboard side of the passage are two other similar staterooms, with a bath between. A recapitulation of the after accommodations shows that there are five single staterooms, one double stateroom, and three bathrooms, all conveniently disposed and intercommunicating, so that a large number of guests can be made perfectly comfortable and secure all the privacy that is required.

At the forward end of the passage, dividing the staterooms, a stairway has been arranged which communicates directly with the deckhouse, a slight recess being made into the engine compartment for this purpose. This stairway lets one in the after part of the deckhouse, which is unusually long, and is divided into two portions, the forward part being used for the dining room, having a galley directly below it, and the after portion being a smoking room or saloon. The exterior of this deckhouse, also plank-sheer, hand rails, companionways and skylights, and all deck bright work are of teak. The interior of the saloon and dining room is to be finished in selected mahogany. The deckhouse is substantially constructed, and the upper portion of it is used as a navigating bridge, and also as a lounging place for the owner and his guests, there being a convenient stairway at the after end for access.

The accommodations for the crew are below forward, commencing at the engine compartment bulkhead, and consist first of a large combined galley and pantry, having built-in refrigerator; the usual lockers and closets for china, cooking utensils, etc., and in addition a hot-water heater, which in cold weather can be used to warm the vessel throughout. On each side of the passage opening into this galley space are separate rooms for the officers, all fitted with built-in berths, wardrobes and lockers; and again forward of this comes a combined messroom and forecastle, giving comfortable quarters for the crew, and a folding mess table where the meals can be easily served from the galley. Forward of this messroom again comes a washing space for the crew, having toilet, shower and lavatory, and also stowage room for the crew's effects. The extreme forward portion of the vessel is bulkheaded off, as is the after end, so as to form a collision bulkhead. The fore part is utilized for the stowage of chains and rope, the after end being the lazarette, and having considerable stowage space.

An inspection of the lines of this craft shows that while on account of her limited draught, the designers have been able to give but little dead-rise to the sections, they have produced as good a sea-boat as is possible, the end being well balanced, and the section showing a very considerable flare forward, which results in a full deck line giving plenty of space on deck, and at the same time producing a craft that will be exceptionally dry in driving through a head-sea. While the vessel is flush deck, as already stated, she is exceedingly well ventilated, and from the beginning of the deckhouse forward she has been given a low bulwark, which adds somewhat to her seagoing qualities and improves her appearance, as it reduces the apparent height of the deckhouse. From the end of this bulwark aft a teak water batten is worked on each side to take care of water on deck, and prevent it from running over the sides of the vessel.

"As this craft is to be largely used in the South, and therefore is liable to take the ground, she is being unusually heavily built, her timbers being double sawn oak, closely spaced, keel, keelson and dead-wood also being of oak, while her planking is of 2-inch yellow pine, all securely fastened in the best possible manner. Being a flush deck boat with continuous deck and good freeboard, she will have a strong and rigid hull and there will be no danger of her hogging or changing shape in any way, a feature that has been noticed in so many recent shallow boats that have been improperly designed and built."



Vitesse II, One-Hundred-and-Forty-Feet O. A. Designed and Built by the Gas Engine & Power Co. and Chas. L. Seabury Co., Cons. for Mr. Brayton Ives, New York

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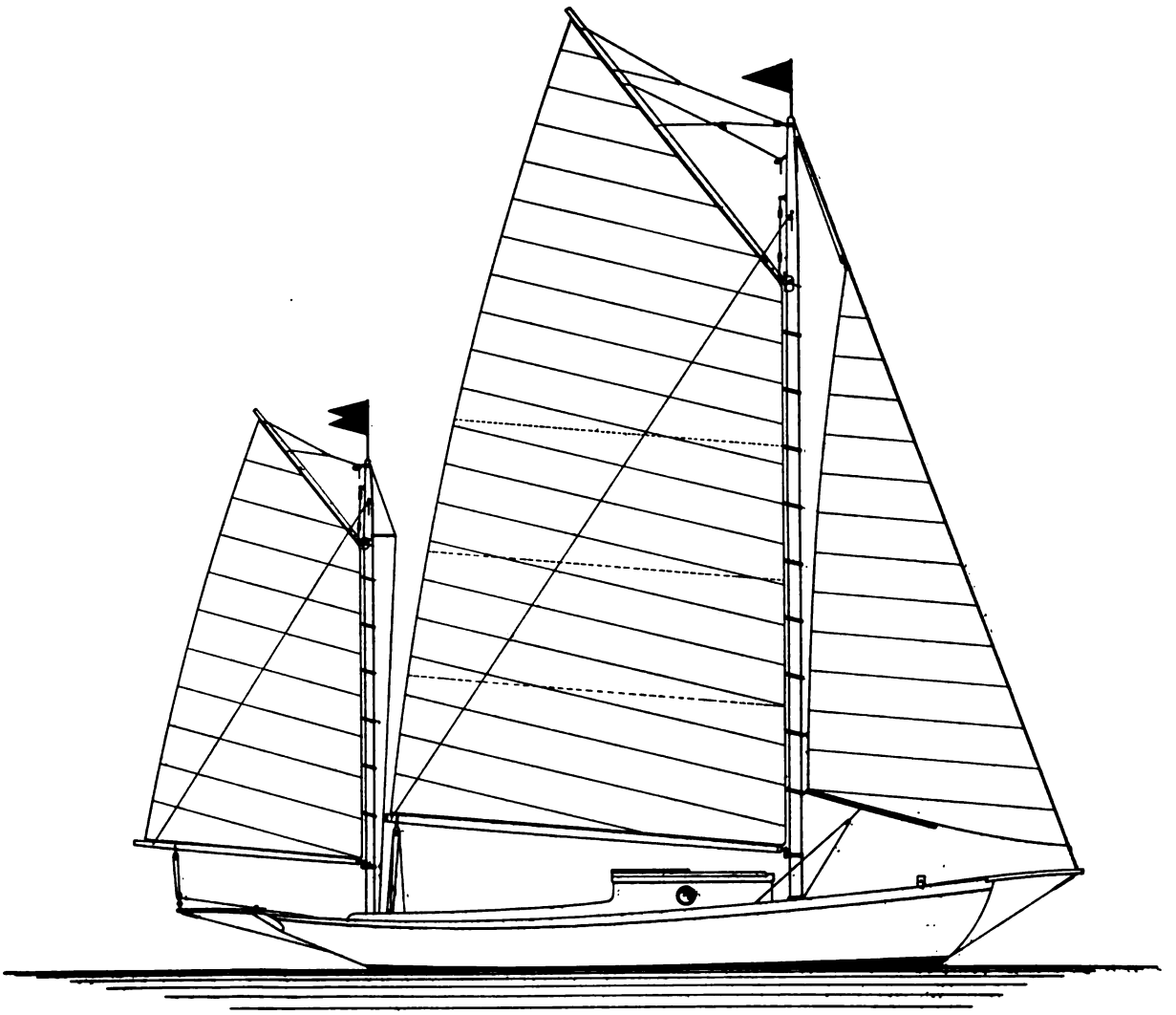

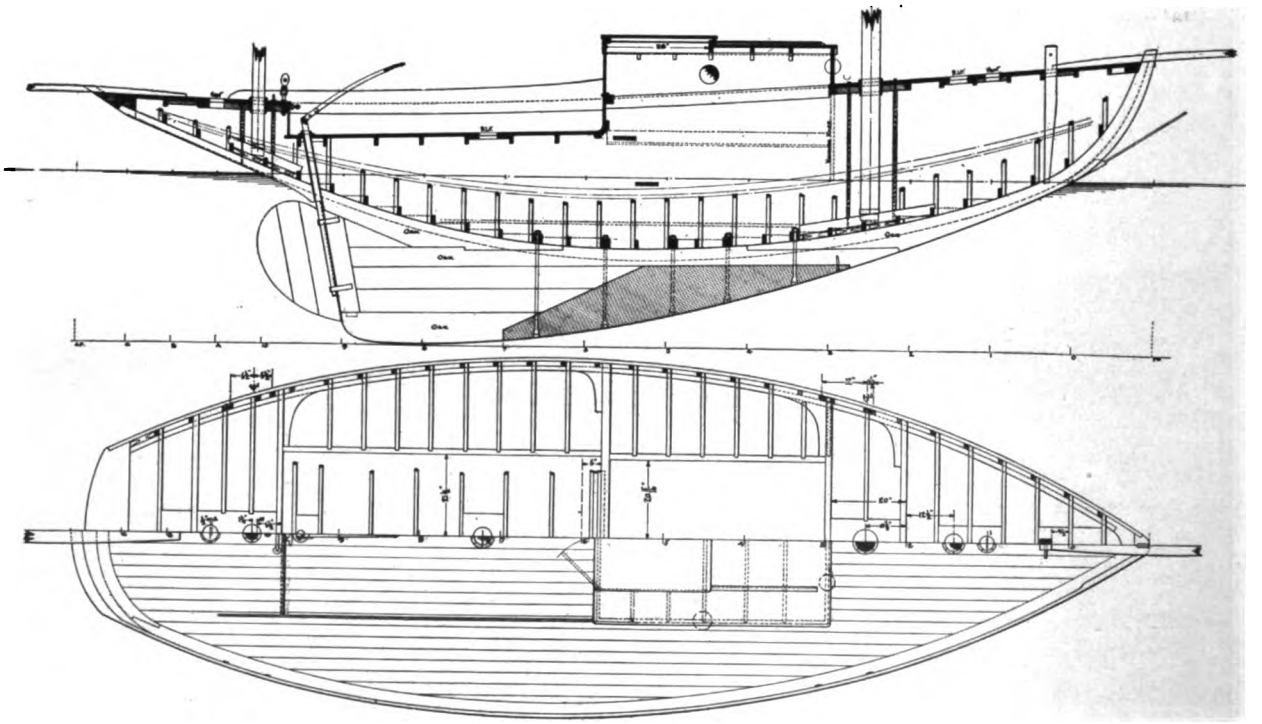

Sail and Construction Plans of Twenty-Four-Foot Yawl. Designed by Martin C. Erismann, Quincy, Mass.

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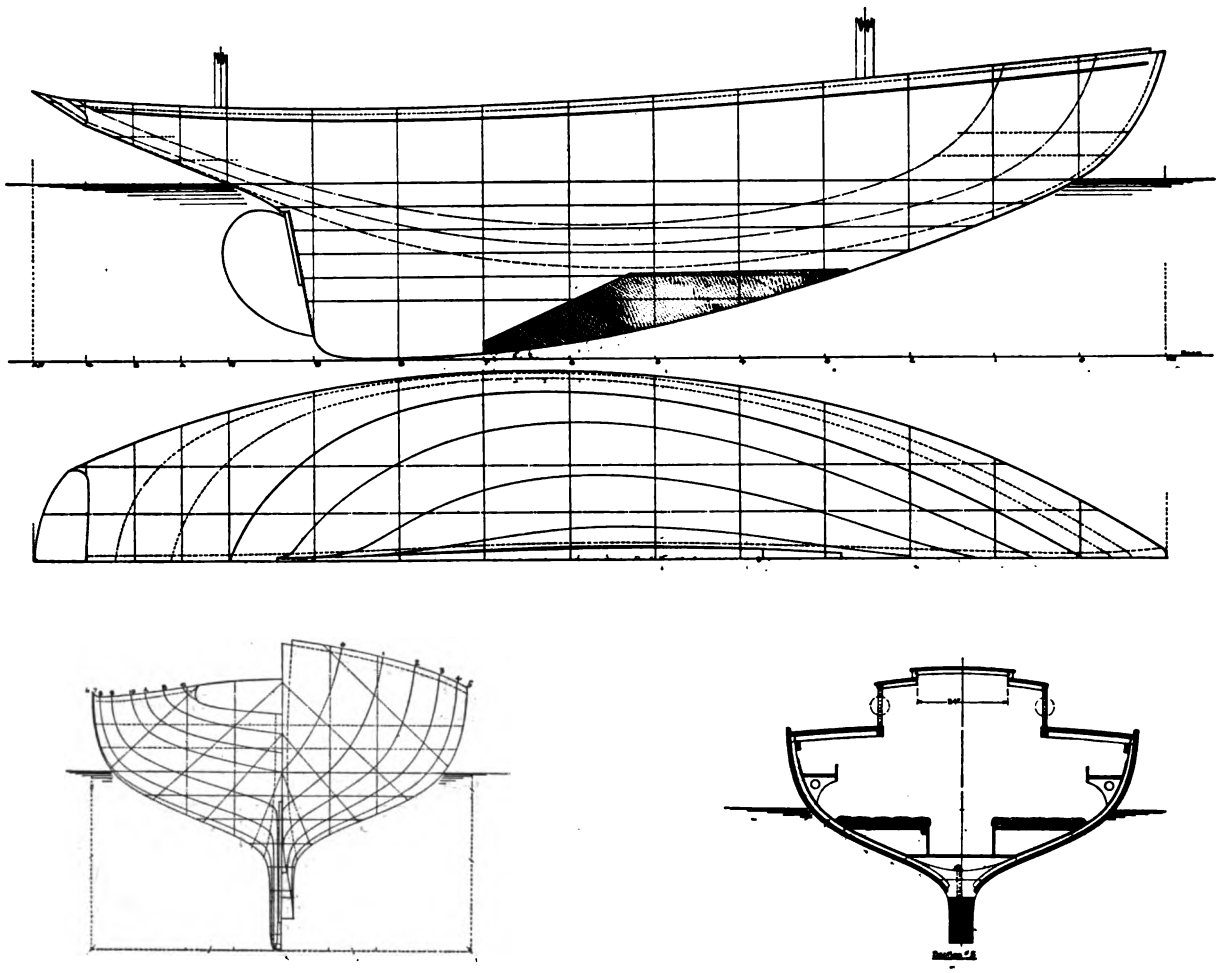

Lines of Twenty-Four-Foot Yawl

TWENTY-FOUR-FOOT YAWL

THE small yawl shown herewith was designed by Martin C. Erismann, of Quincy, Mass., as a small, easily handled day sailer for use about Massachusetts Bay, with sufficient power to negotiate a trip around the Cape should occasion arise. The designer states that the little craft was given a high sail plan on account of her having considerable breadth, the sail plan being more efficient in light winds than a low rig.

General dimensions are as follows:

Length o. a.....	24	feet	0	inches
Length w. l.	18	"	0	"
Breadth	8	"	0	"
Draught	3	"	6	"

MADEGARE II

THE 60-footer, shown on pages 260 and 261, was designed and built by Frederic S. Nock, of East Greenwich, R. I., for E. P. Lawson, of New York City, as a medium-speed cruising craft. The power plant comprises a Twentieth Century, four-cylinder, four-stroke engine, 6½-inch bore, 8½-inch stroke, which gives her a cruising speed of 11 miles per hour.

The general appearance of the boat shows that there is nothing radical in her design. The forward sections are fairly sharp at the water-line with considerable flam, thus insuring a dry boat and allowing the maximum amount of deck room forward. The bridge deck, 5 feet in length, makes an ideal place for the owner and his guests in moderate weather, and with the spray cloths set has proven quite comfortable in a jump of a sea. Room for several persons is provided on the seat, and wicker chairs will admit of accommodating four to six persons. There is good deck room either side of the cabin trunk, and while the after deck is but 11 feet long, there is still room for quite a number of chairs besides the curved wicker seats fitted to the shape of the railing.

The plans show the general arrangement of the interior. Windows that drop into pockets on both sides and across the after end of the trunk admit of plenty of ventilation. The companionway on the starboard side leads direct to a passageway leading fore and aft. At the after end is the owner's stateroom fitted with double berth, clothes lockers, lockers for shoes, linen, etc., desk and bureau. Directly across from the companionway steps is a large clothes-press with shelves for linen, etc. Forward of same is a guest's stateroom with single berth, clothes locker and bureau, and opposite is a bathroom fitted with tub, lavatory, and yacht closet; and leading from this room under the companionway steps is a large locker. The forward end of the passageway leads direct to the saloon; no doors are used to shut off same from the rest of the boat; there is an archway supported on turned columns and portieres are set so as to be used when desired. The saloon

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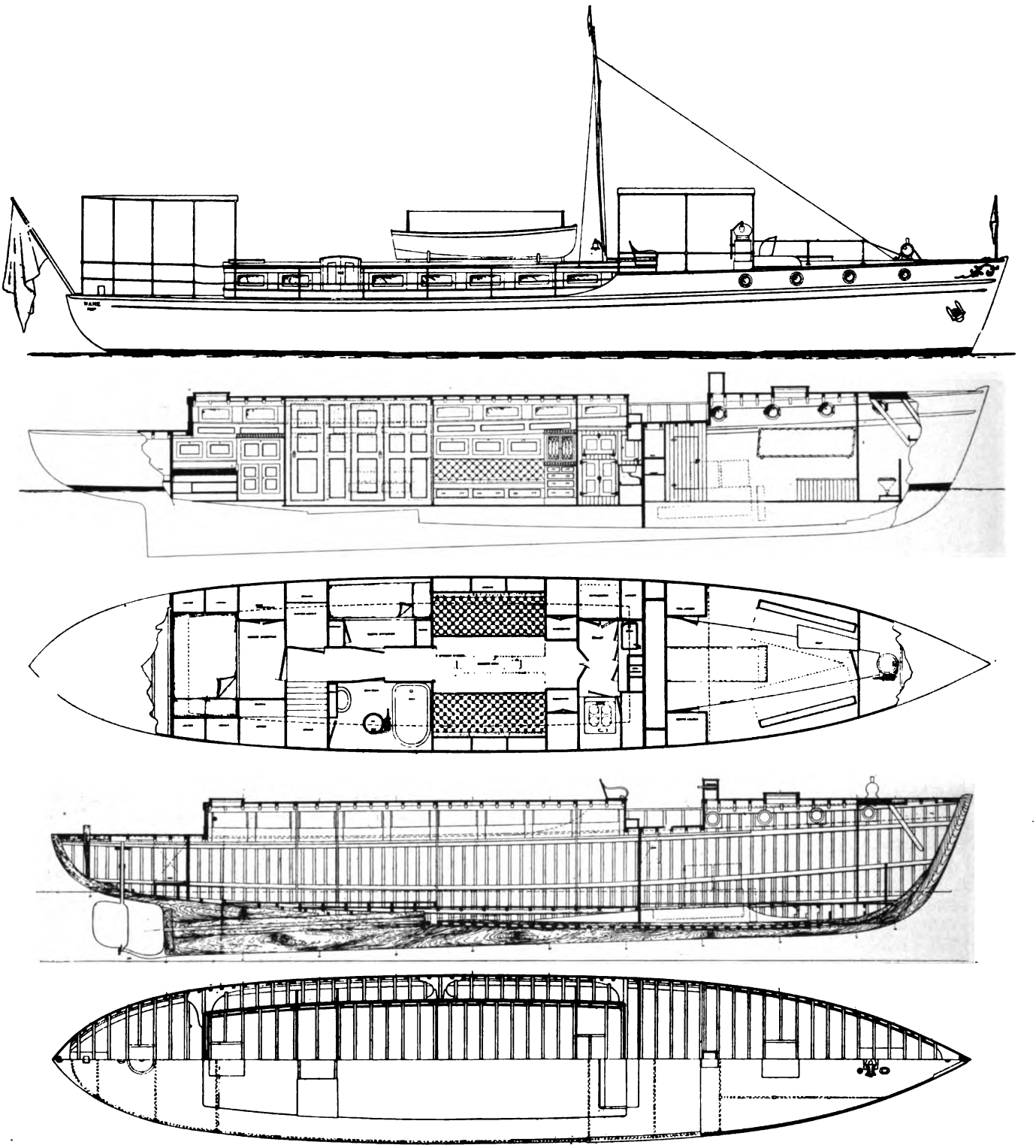

Sixty-Foot Power Cruiser. Designed and Built by Fred. S. Nock of East Greenwich, R. I., for Mr. E. P. Lawson of N. Y.

is fitted with two extension berths which afford ample sleeping accommodations for four persons; drawers under the berths and lockers back of same allow for the storing of bed linen, blankets, etc. On either side at the forward end there is a large sideboard and buffet with drawers for table linen, cutlery, silverware, and the locker on the port side is arranged for glasses, liquors, etc. The opposite locker is arranged as a bookcase. The galley, which is located forward of the saloon, opens directly into same, and is complete in all details. Access to the galley from the deck is through a hatch on the port side, and said hatch is so arranged that the ice can be passed down to the refrigerator. A double water-tight bulkhead separates the engine room and crew's quarters from the owner's quarters. The engine room, while not very large, is of ample dimensions to admit of working around the engine with ease when making repairs or cleaning same. The gasolene is carried in a tank aft of a water-tight bulkhead under the after deck. The water tank is situated over the

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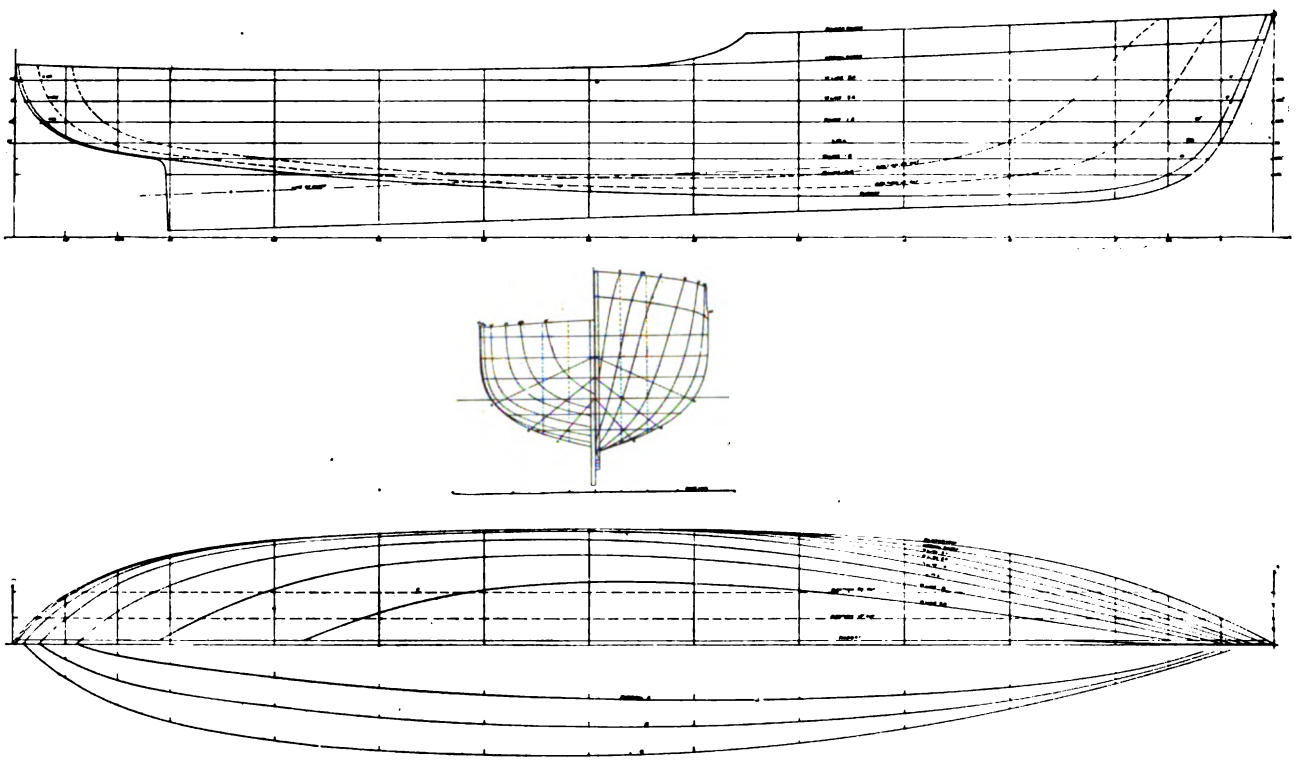


Lines of Sixty-Foot Power Cruiser

reverse gear of engine, being fed by gravity to the lavatories and sink. The lubricating oil is carried in a tank under the step of the bridge deck seat. A very complete electric lighting plant is installed in the engine room, the generator being hung in a frame over the fly-wheel and supported on pipe stanchions. The boat is lighted throughout by electricity even to the sailing lights, and a 2500-c.p. searchlight mounted on the awning frame over the bridge deck.

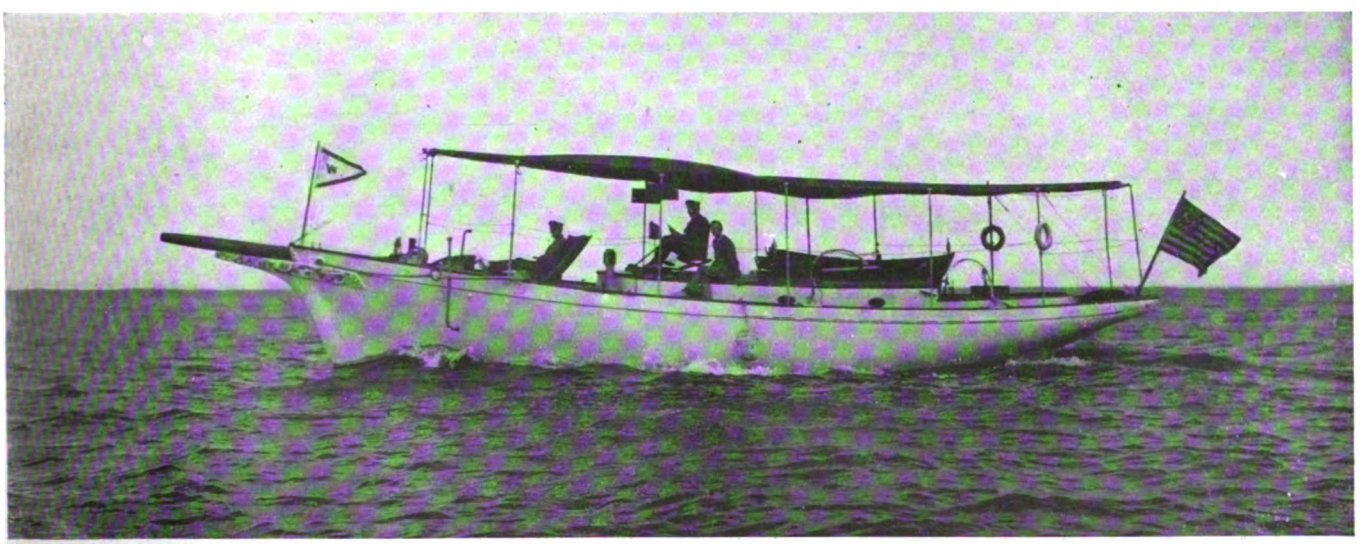
The general dimensions of this craft are as follows:

Length o. a.	60	feet	0	inches
Length w. l.	54	"	0	"
Breadth	11	"	0	"
Draught	4	"	4	"
Displacement	38,600	pounds		

TWENTY-ONE-FT. POWER CRUISER

PERHAPS the smallest cruiser practicable is one similar to that shown on the following page, which was designed and built by the Bath Marine Construction Company.

The arrangement of the engine, the company claims, is an idea original with them, and was devised so as to keep the smell and danger of gasolene gases out of the cabin and still have the engine protected from the weather. This was not only accomplished by this arrangement, but the portable cover over the engine provides good seating accommodation, so that no space is lost by the room taken up by the engine. The engine is also readily accessible and convenient to the man operating the boat. The reverse gear is not shown on this



What Happens to the Old Timers. Note the Automobile Steering Wheel and Morris Chair Effect

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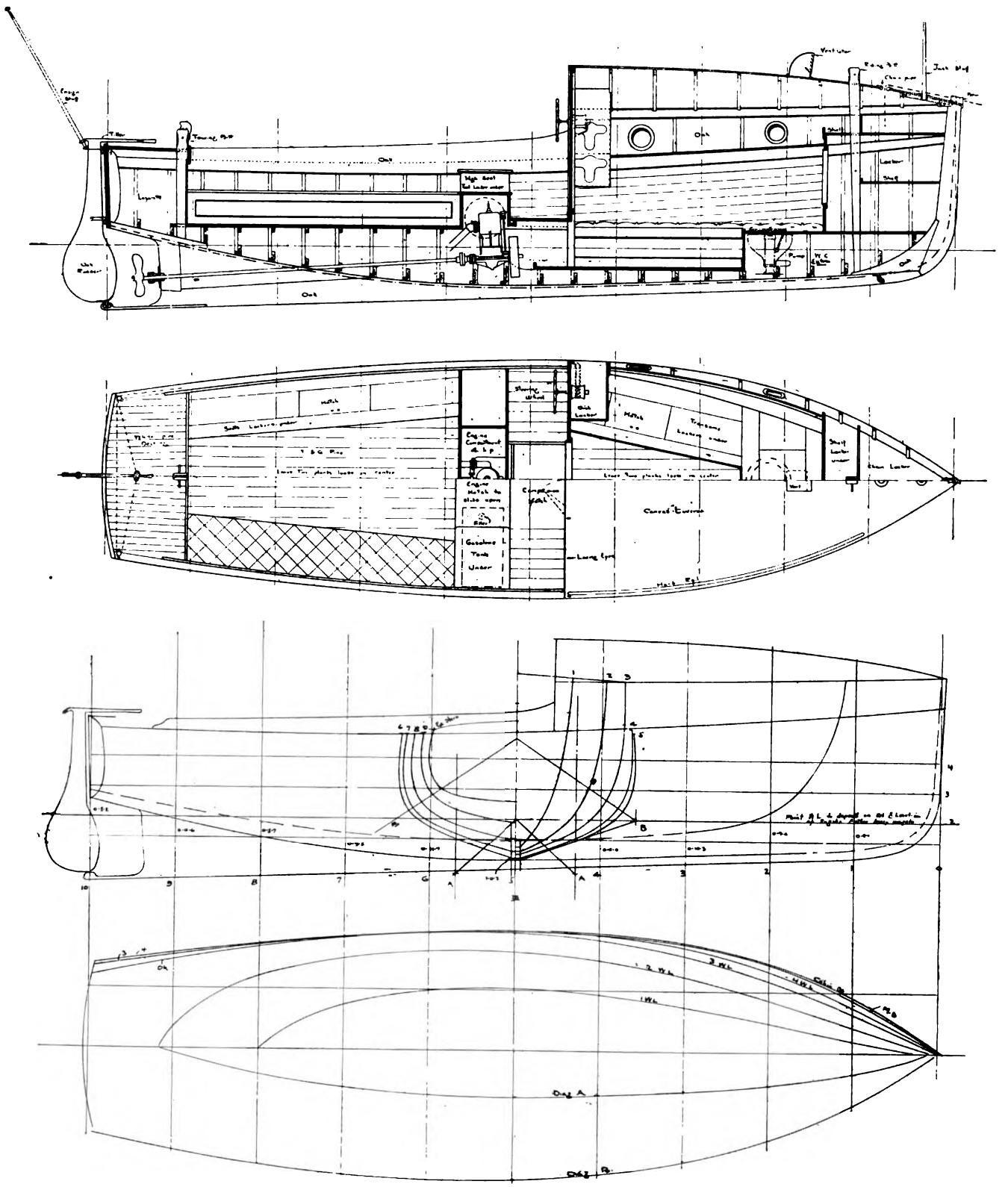

Twenty-One-Foot Cruiser, Designed by Bath Marine Construction Co., Bath, Me.

drawing, but was installed with reverse control led back to alongside of steerman's seat, as were the spark and throttle, controls, the boat being entirely controlled from this point. The steering gear, it will be noted, is carried alongside of the coaming and on top of the deck. The rudder is hung outboard so that all parts are accessible, and should anything go wrong with the lines leading to the wheel on the after side of the house the boat could be steered by the tiller on the after deck. In fact, it was found that this tiller was very often used instead of the wheel in one of the boats built from the plans.

"The small boat's appearance, probably more so than

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in the larger sizes, is obtained by the proportion and moulding rather than by the brass rails and fittings. Although only 21 feet in length the amount of accommodation in this boat is remarkable, eight or ten people being carried in the cockpit without crowding. The cabin was made only for shelter in case of bad weather and for the storage of cushions, guns, etc., but by having bunk boards fitted between the transoms and a cushion fitted for same a very comfortable bed was formed."

The general dimensions of this boat are:

Length o. a.	21	feet	0	inches
Length w. l.	20	"	5	"
Breadth	6	"	2	"
Draught	1	"	10	"
Freeboard, bow	3	"	6	"
Freeboard, amidships	1	"	11	"
Freeboard, stern	2	"	0	"
Headroom	5	"	0	"

TWENTY-FOOT POWER DORY

THAT there have been vast changes in the New England fisherman's dory, as originally designed, goes without saying, and few of the old fishermen would consider the design shown herewith as being of that type, although the design, which is the work of E. B. Schock, was made for fishing purposes along the upper New England and Nova Scotia coast.

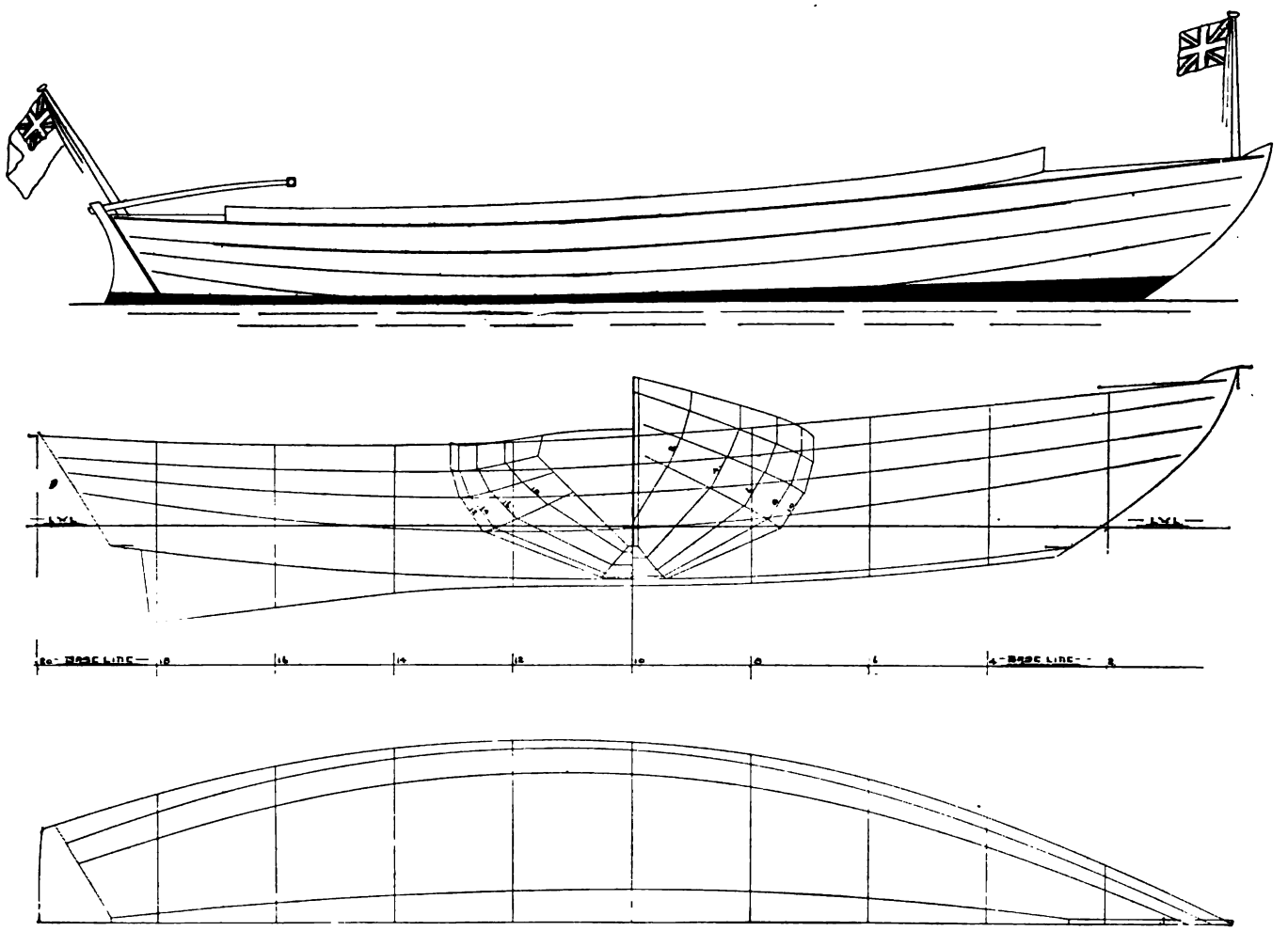
These dories have become very popular with yachtsmen all over the country, owing to the fact that they cost less than the regular type of power boat and are just as seaworthy, while they drive remarkably easy up to a certain speed, but beyond that they drive very hard, owing to the shape of the stern.

As the boat was to be used primarily for fishing purposes, the forward part of the cockpit was kept clear of seats, so that the fishermen could handle their lines to better advantage and at the same time it would serve as a sort of well in which to place their catch. It was also necessary to keep the cost of the boats down, and for this reason it was thought best to use a regular tiller for steering purposes, rather than go to the expense of a wheel.

The engine shown is of the two-stroke, heavyweight slow-speed type of 4 h.p., which was found sufficient for all purposes. The hulls were well built of oak for bottom board, frames, stem and transom, with cedar planking and white pine decks.

The dimensions are:

Length o. a.	20	feet	2	inches
Length w. l.	16	"	10	"
Breadth	6	"	2	"
Draught	1	"	8	"
Overhang, forward	2	"	4	"
Overhang, aft	1	"	0	"
Freeboard, bow	2	"	6	"
Freeboard, least	1	"	4	"
Freeboard, stern	1	"	7	"



Twenty-Foot Power Dory. Designed by Edson B. Schock, New York City

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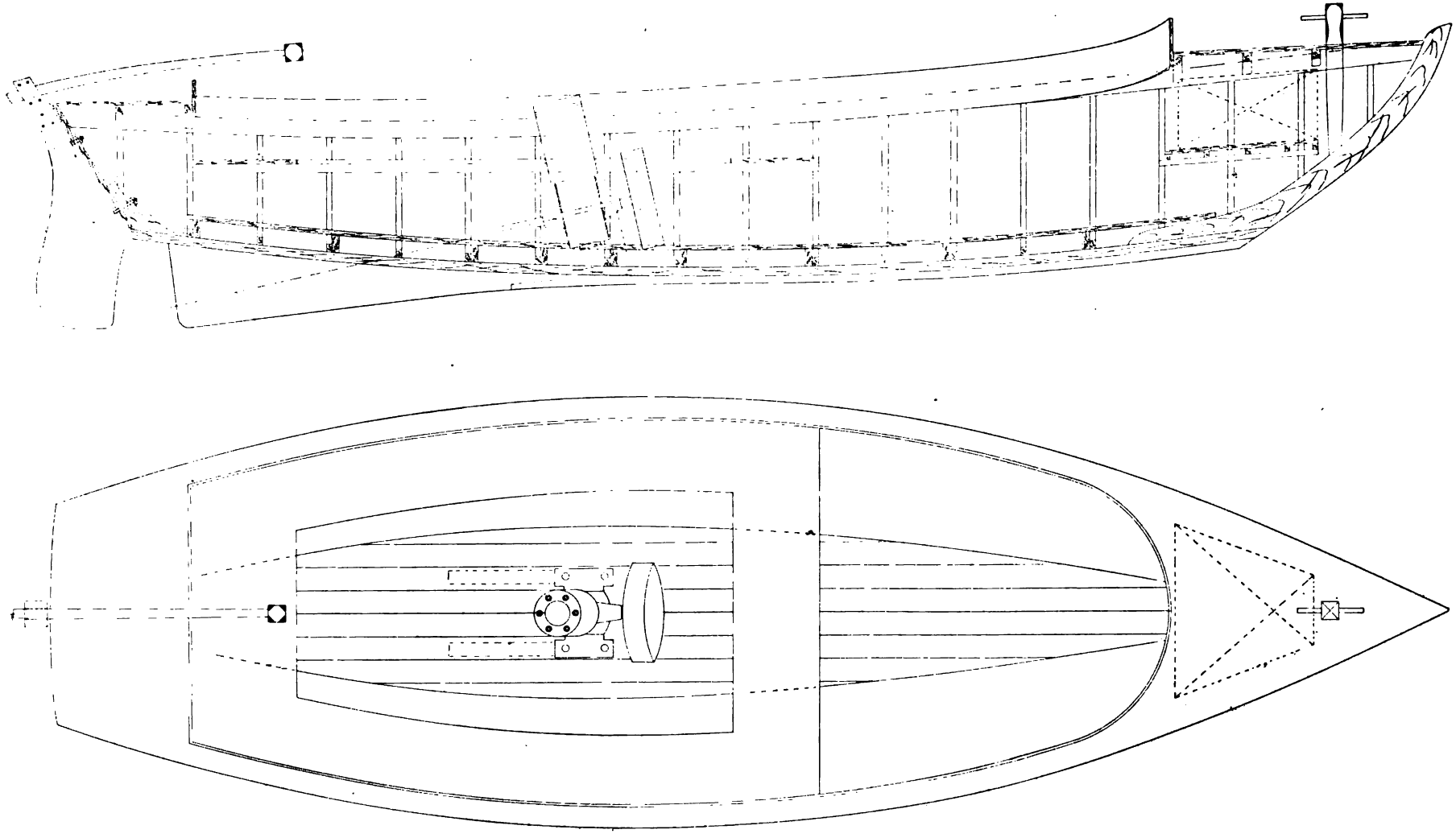

Arrangement Plan of Twenty-Foot Power Dory

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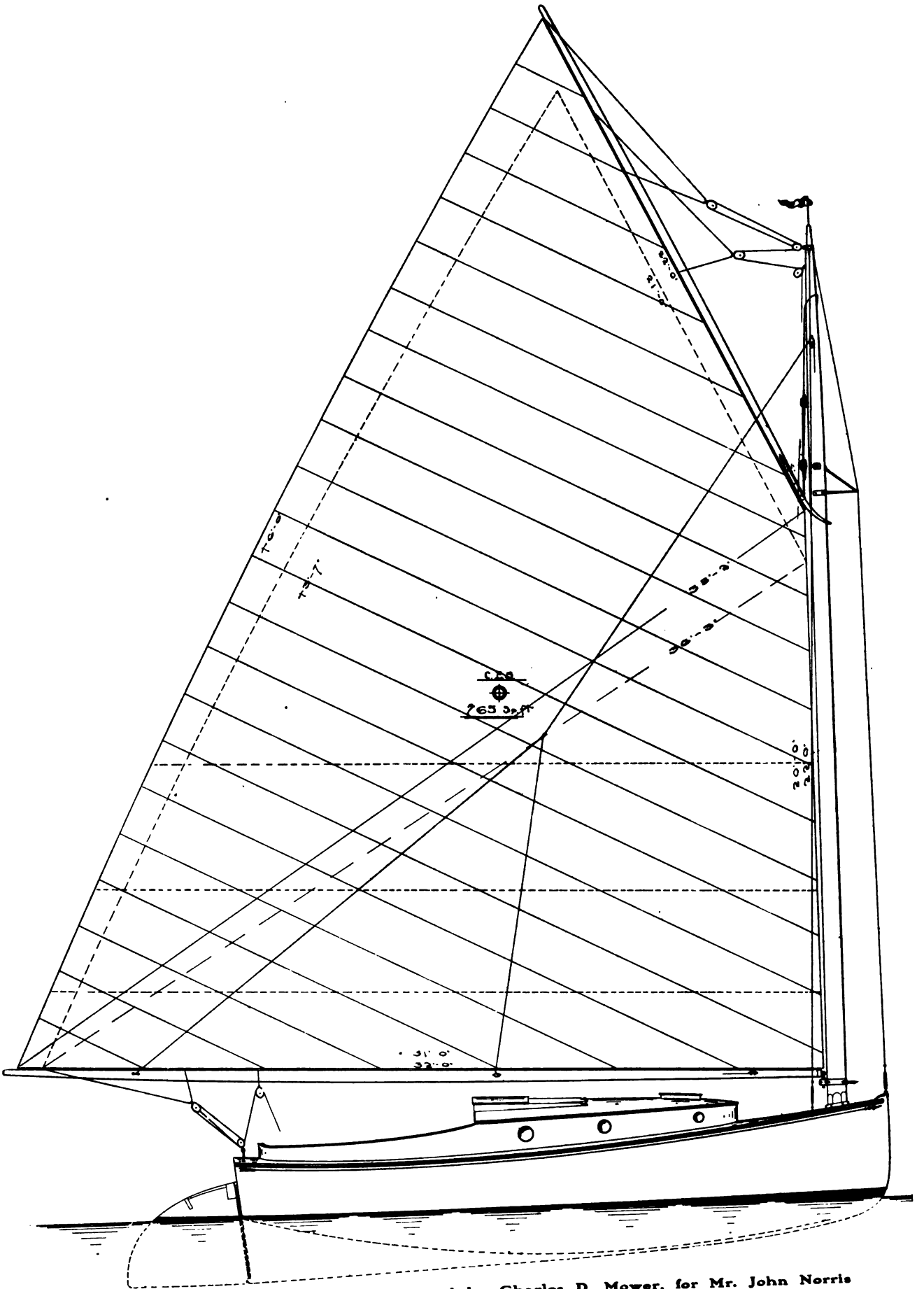

Twenty-Six-Foot Catboat Virginia. Designed by Charles D. Mower, for Mr. John Norris
Description on Page 267

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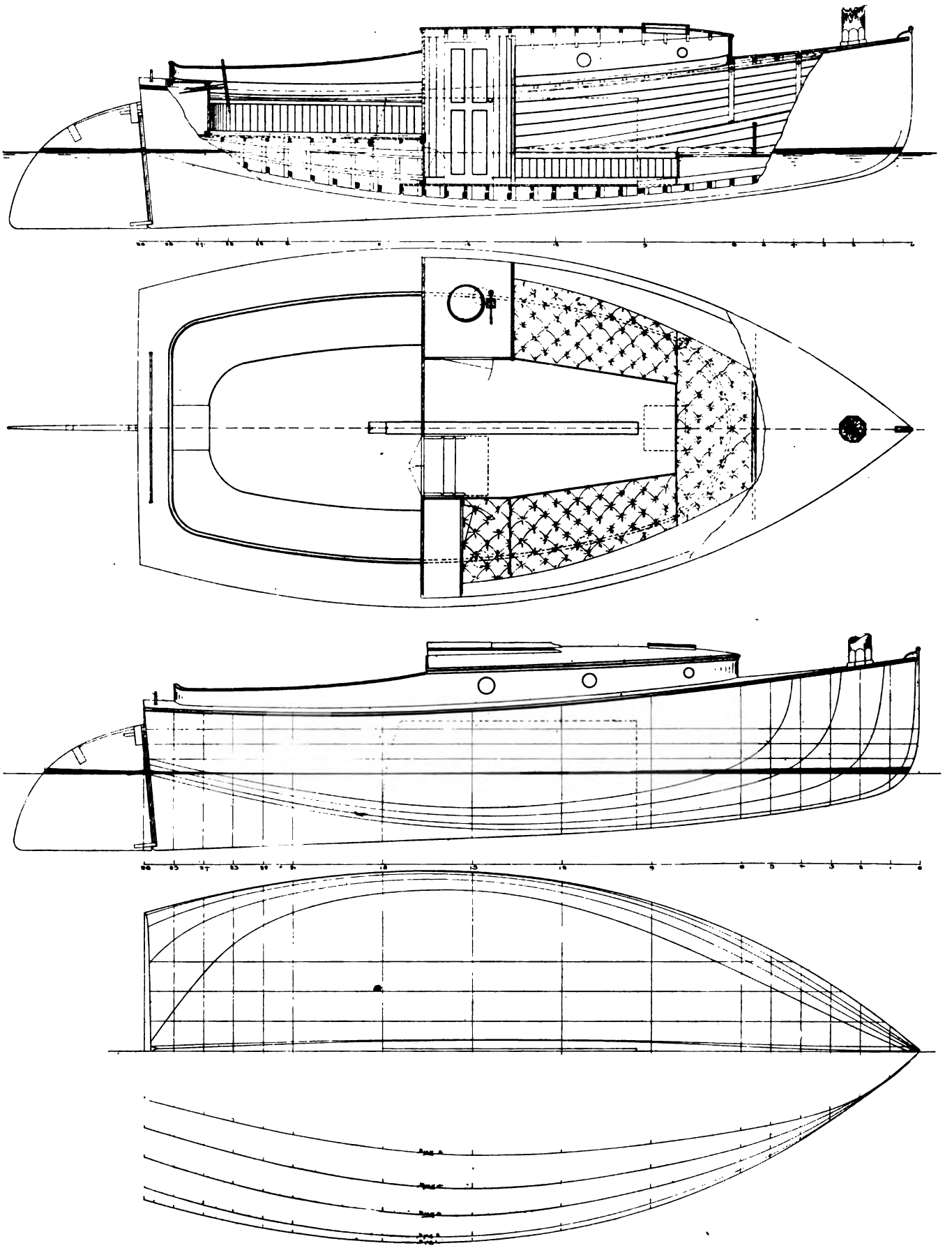

Cabin Plan and Lines of Twenty-Six-Foot Catboat Virginia

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HURRAH'S NEST

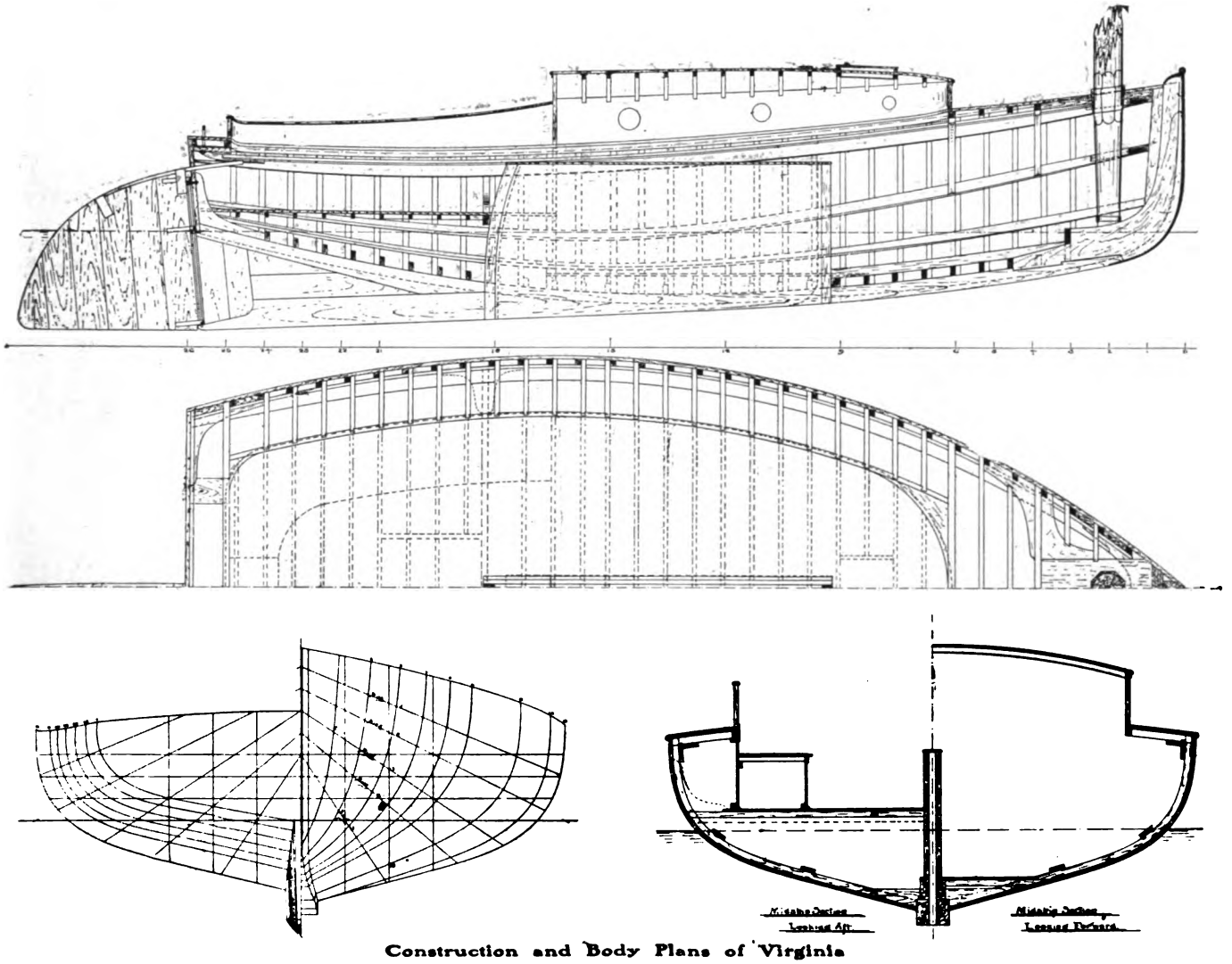
"A Place for everything and nothing in its place." Letters for insertion under this head are limited to two hundred and fifty words, and must be accompanied by correct name and address of writer. Address the Hurrah's Nest, care Editor THE RUDDER, 1 Hudson St., N. Y., U. S. A.

ECHO OF THE CATBOAT MATCH

I HAVE read the article on the Interbay Catboat Match by Winfield M. Thompson and while my old friend Thompson may be sure that my regard for him or for any one else will never be hurt to the slightest degree by any fair criticism of my work, I must put myself on record with a protest against statements so prejudiced and unfair as some which he has allowed himself to make in reference to Mr. Norris' catboat Virginia.

The statement that Virginia "finished at the foot of the list" is not a true one, as the records given in the article show that in the first and second races Virginia finished fourth, beating a Narragansett Bay boat in each race; in the third and fourth races Virginia finished third, and in the fifth race she was again fourth. The total of points given by Thompson does not agree with the summaries given, as he credits Virginia with only 200 points when she should have been credited with 240. Ina and Bother on the other hand are credited with larger scores than the summaries show they won according to the positions in which they finished.

In reference to the design of Virginia, Mr. Thompson



Construction and Body Plans of Virginia

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gives his readers the impression that no especial amount of care was given to working out her design, and this is certainly neither fair nor true, as the design was carefully worked out and the result was a perfectly balanced boat under any and all conditions—something that cannot be said of catboats in general. I am sending the plans of Virginia to you for publication, so that your readers may judge from the lines if the boat is the "tubby boat" that Mr. Thompson calls her. The sheer which Mr. Thompson calls straight, is made strictly according to the class requirements for freeboard at bow and at lowest point so that the fault, if any, lies with the rules and not with the designer.

The criticism of hollow spars for a catboat is a matter of opinion entirely, and I do not agree with friend Thompson that a solid mast is better than a hollow spar for a catboat, and I have a number of successful cat-rigged boats to base my opinion upon.

Virginia was designed to be a boat that could be driven with a moderate sail plan and a moderate amount of ballast. She did not have a good sail, but that was the fault of the sailmaker rather than in design of sail plan.

That Virginia failed to make a better showing in the match was in a large measure due to her lack of tuning up, as she was a new boat and had had nothing to tune up by with the exception of a new Crosby boat which she easily defeated in all races sailed in her home waters.

As Mr. Thompson says, the success of a cat depends very largely upon proper balasting, and in this respect Virginia suffered greatly by the lack of any trial horse for tuning up.

The chances are that Virginia will come back for another try next year as Mr. Norris, her owner, is already making plans for next season and the Inter-City Match will probably be included in the program. Then, my dear Thompson, we'll see if we can't get back at you.

General dimensions of Virginia are as follows:

Length o. a.	26	feet	0	inches
Length w. l.	25	"	4½	"
Breadth, extreme	12	"	0	"
Breadth l. w. l.	10	"	9½	"
Draught, extreme	2	"	7	"
Freeboard, bow	3	"	11	"
Freeboard, stern	2	"	3	"
Freeboard, least	2	"	0	"
Area, mainsail	765	square	feet	

CHARLES D. MOWER.

LIGHTING OCEAN RACERS

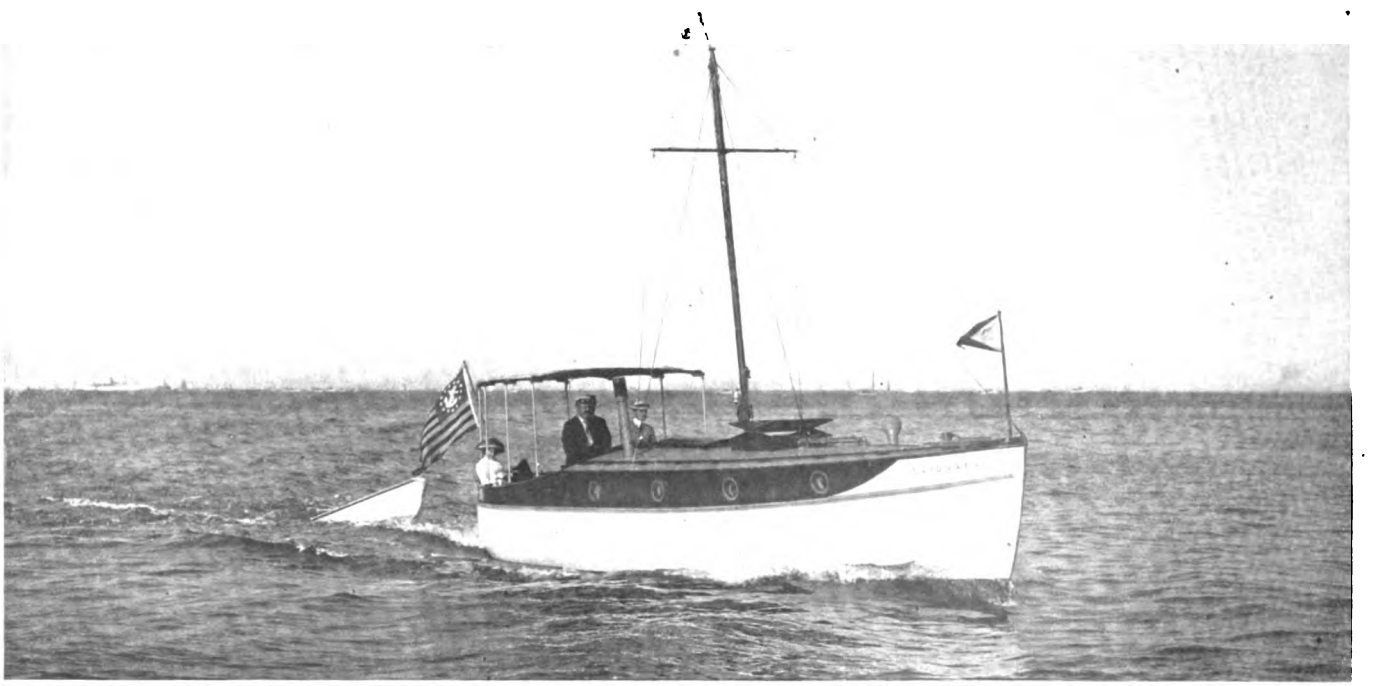
I HAVE looked through your very interesting July issue and was a little bit startled to note, on the first page, your suggestion in reference to making it compulsory to use electric lights from a generator if another long race is to be held.

If there is any good reason why our system cannot be used under such conditions as you referred to, I certainly would like to know what they are. The fact of the matter is, that there were no boats in this race equipped with our system, and I am afraid this was due to a large extent to the statements credited to a Philadelphia designer, who, for some unknown reason, is under the impression that the system is dangerous.

If you will give us your objections to our system as applied to such boats as enter these long races, it would be appreciated and, if it is as you say, that all such boats should be equipped with an electric generating plant, the sooner we get out of the boat business and stop our advertising for such, the better.

We have received a good many endorsements during our few years of existence and, as far as I know, we have not a single dissatisfied user. Everybody that ever used Commercial Acetylene for boat lighting speaks of it only in the highest terms.

I don't want you to misunderstand me to mean that an editor should favor his advertisers. I believe there



Sayonara 36 Ft. O A. 12 H.P. Standard Engine, Owned by Mr. Henry W. Ellison New Bedford, Mass.

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is altogether too much of this and that, because of the fact that the editorial policy of most papers depends upon the advertising pages, it is seldom that we see just criticism by the editors. There is nobody that I admire more than the editor who has the courage of his convictions and who comes out flat-footed and says what he means, telling the truth irrespective of whether or not such plain truths will hurt or help, as the case may be, advertisers or prospective advertisers. The editorial policy of most papers of to-day, I think, is represented by the dollar sign.

While on the subject, you may be interested to know that Eronel is equipped with our system, and I don't believe had any trouble with her lights during the Bermuda Race. In past years, we have had boats in all kinds of races and the representative boats starting for Bermuda this week are equipped with our system. We do not believe there will be any trouble with the lights on these boats. Also, you may be interested to know that Mr. Cochrane's Westward, which lately crossed the Atlantic and has won several races on the other side, is equipped with Commercial Acetylene.

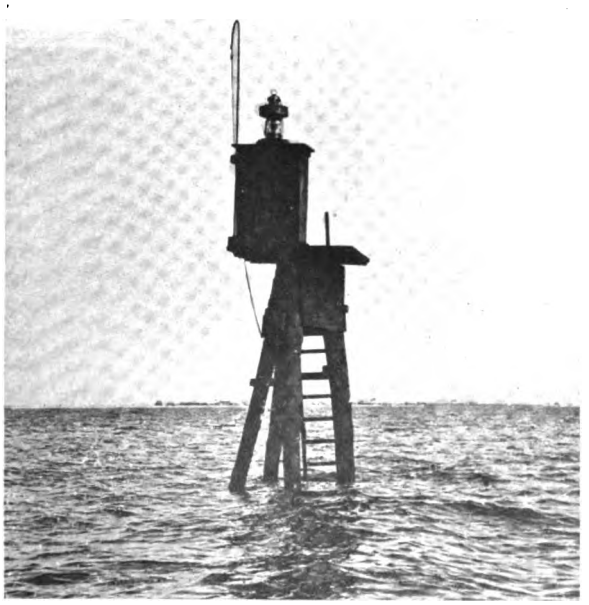
I must repeat that I think your statement in the July issue, above referred to, that electricity from a generator is the only satisfactory light, is way off, and should in some way be corrected. OSCAR F. OSTBY.

* * *

[I am glad Mr. Ostby has called my attention to the matter. What I meant to say was, if electricity was used it should be compulsory to put in an efficient plant and not a silly makeshift outfit. I have always strongly endorsed the acetylene system of Mr. Ostby's company, and have been shipmates with it several times, and could not ask for a brighter or more reliable illuminant.—EDITOR.]

BEACONS IN SHEEPSHEAD BAY

SOME of the good work being done by the Waterway League of Greater New York is shown in the photograph, very kindly sent in by Mr. Theodore K. Hastings. This is a beacon erected to mark the channel in Sheepshead Bay, Long Island, where the water is extremely shoal and the mud very inviting.



Beacon Placed Through Waterway League Work

Chinese Junk in Shanghai

CHINESE JUNKS

I NOTE in THE RUDDER your thanks to those of your readers who have sent you cards and pictures. I don't know what you asked for, but am sending what I think you would like. The war junks are still more curious than these boats, but I have no pictures of them as yet.

Shanghai. FRED HOBSON.

CONCERNING PIONEER

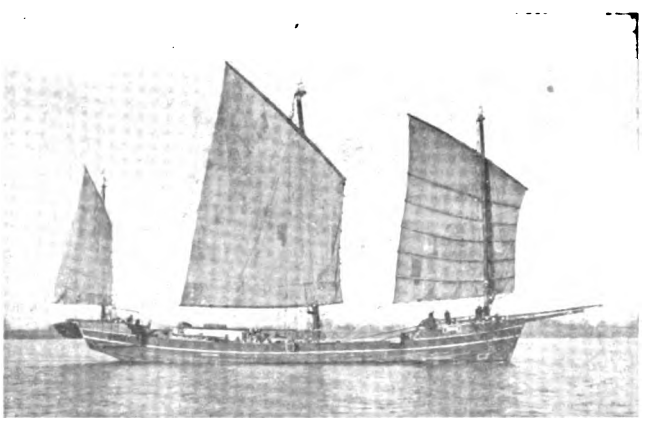
I WISH to thank THE RUDDER for the good words for Pioneer in the September issue.

While I am an American, I, of course, wanted to see Pioneer win: think it would have been a good thing all round; however, I am pretty well satisfied, as the American trade papers I have seen could hardly have done more for me if Pioneer had won.

I take it that the hydroplane has had a good introduction, and its progress in the States will be very rapid: of this I am absolutely sure, because I know the advantages of the hydroplane principle, and furthermore I have had the satisfaction of seeing the hydroplane make a clean sweep in England this season.

The ordinary type of boat as a racer has come to the end of its days in England; it will soon be true in the States.

As compared with the ordinary boat, my hydroplanes have in some instances shown a gain of approximately 50% in speed for the same power and weight! This percentage will, I think, be increased with the very high powered boats, and of course decreases as the horsepower per ton is diminished. At high speeds, the re-



Another Type of Chinese Junk

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sistance of a properly constructed hydroplane increases barely as the speed increases.

In fact, some towing experiments that I have made with a 5-metre hydroplane hull, prove to my satisfaction that the resistance does not increase in proportion to the speed.

Pioneer is a pretty forcible example of the efficiency of the hydroplane system. Pioneer, as you saw her racing, is nearly four-fifths the weight of Ursula, yet with one of Ursula's engines (one-half the power) Pioneer is the faster boat!

While the speed of Pioneer was very satisfactory, the British International Trophy regulations caused certain complications in the installation, which, in connection with the very limited time for "tuning up," materially handicapped her speed.

The introduction of the hydroplane offers an opportunity for putting new life into the power-boat business that I think the live people in the trade will not be slow to take advantage of. The hydroplane will prove a much more attractive proposition from the sportsman's point of view, as speed is practically unlimited, and as speed increases greater skill will be required to race the boats, and the perfection of engines and boats can be refined to an art.

As with the bicycle, the automobile, and the aeroplane, the sporting feature is only one branch of the business, and a stepping stone to the commercial end, in which various uses will be found for the hydroplane.

The hydroplane craft will rapidly increase in size, and in a very short time, fast launches and yachts will be a feature of the trade.

Now all this means new business for constructors, builders of engines and specialties—new *advertising pages* in your papers, and new *technical matter* and *sporting news* for your columns.

The purpose of my letter is to reflect, if possible, a little light on this golden opportunity.

Hydroplanes are not only superior in speed, but they can be built on pretty lines: my boats handle to perfection, will take the turns with less loss of speed than the ordinary type, and they are better and drier sea-boats.

America is called a great country—yet with all her manufacturers of engines and boat-builders, we do not find enough boats on hand for an important event like the British International Trophy Race to hold an eliminatory contest.

Apparently there is an opportunity for more organized effort, and business and the sport would benefit particularly by one good international event per year, conducted under carefully thought-out regulations; such an event to be successful should extend over at least three days, and offer substantial cash prizes.

Yours very truly,

Nauterre, France. W. H. FAUBER.

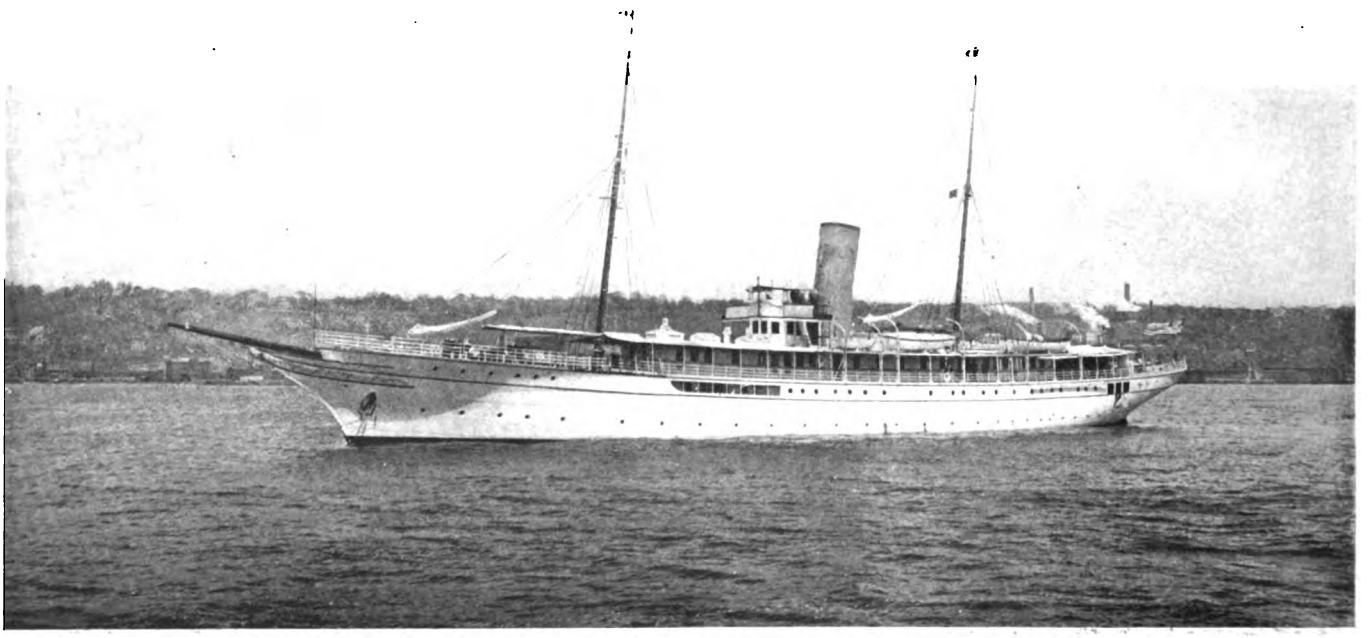
RUDDER FOR SEA-WREN

I AM building a Sea-Wren from plans in THE RUDDER, and would like to know the simplest and best way to hang her rudder.

FRANK BAILEY.

* * *

[Drive two eye-bolts into the stern-post and two into the rudder, the ones in the rudder above those in the stern-post so that the eyes in the rudder will play on the eyes in the stern-post. Then take an iron rod of thickness to pass through the eyes, not too much play. This makes a trustworthy and easy hinge. The top of the rod should be bent to keep it from slipping out. This is simpler and better than using gudgeons and pintels.—EDITOR.]



S. Y. Liberty, Owned by Mr. Joseph Pulitzer, New York

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DISTANCE TO BERMUDA

WILL you please tell me what the exact distance is from Sandy Hook to Bermuda, and what is the record time for a power boat in the races to that island?

GEORGE J. STEPHENS.

* * *

[The distance from Sandy Hook to North Rock, on the edge of the Bermuda Reef, is 648 sea miles. The record is held by Ailsa-Craig, made in the race of 1907, of 64 hours 21 minutes.—EDITOR.]

THE RUDDER DINGHY

I HAVE just launched and tried a 14-foot sailing dinghy from lines published in THE RUDDER of last December, by C. D. Mower, and have no hesitation in saying she is a wonderful little boat in more ways than one. I have tried her on and off the wind, under full sail in a 20-mile breeze, and the way that little boat acted was simply wonderful. Going to windward and reaching she is very fast, but before it she fairly scoots. I have never seen a boat of her size work like she does; but what impressed me most is her wonderful ability to carry sail. By sitting on the weather deck, she simply stands straight up and races like a fast power boat. There may be some of your readers interested in this design and if so they will be pleased to hear of her good qualities.

Would you kindly inform me if stays should be fitted on both sides? There is only one shown on the plan, from masthead to stem. I am afraid I shall lose my mast in the first heavy blow I have her out in, as it bends like a whip, although made to dimensions.

I would add that she steers well on all points of sailing. I am using the gunter sail. Another boat is building off my moulds to be fitted with the leg-of-mutton. It will be interesting to find out under which sail the boat works best.

LIEUT. A. MULCAHY, R. C. A.

* * *

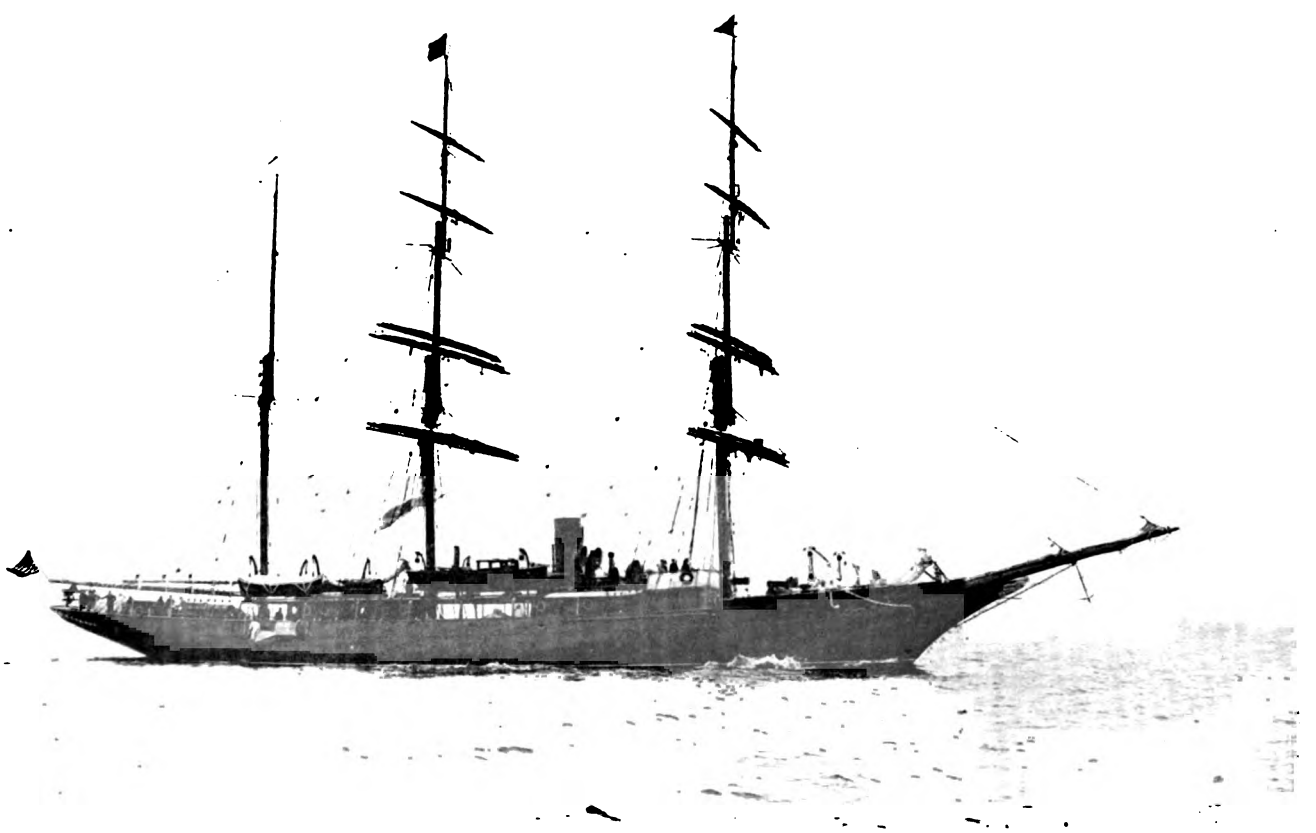
[I have also had a good report from the dinghys sailed at Rochester, N. Y., and have heard that one of the Massachusetts Bay clubs will adopt it for a one-design class. I don't believe in shrouds for so small a rig. It is better to increase the heft of the mast.—EDITOR.]

LUFFING RULES

RULES are made to protect men's rights and not their wrongs. You cannot encourage a damage against yourself and then invoke the law against the damager.

Many cases of fouling due to this misconception of the luffing rule come under my notice; in almost every instance the boat fouled and claiming the protection of the rules was fouled through her own efforts to use the rule unfairly for the purpose of damaging her opponent's chances. The rule permits of your luffing to prevent the passing of an opponent to windward, but it only permits you to do this in a fair and seamanlike manner; it does not permit you to employ an unfair and lubberly maneuver to prevent your opponent passing you.

In the case under consideration three boats were reaching with balloon jibs set. Pele, the leading boat, was to leeward and ahead of Edna, the second boat. On Edna making to pass Pele to windward, the latter let fly her jib-sheet and luffed across Edna's bow; Edna



Aloha. Flagship of the New York Yacht Club, Owned by Com. Arthur Curtiss James

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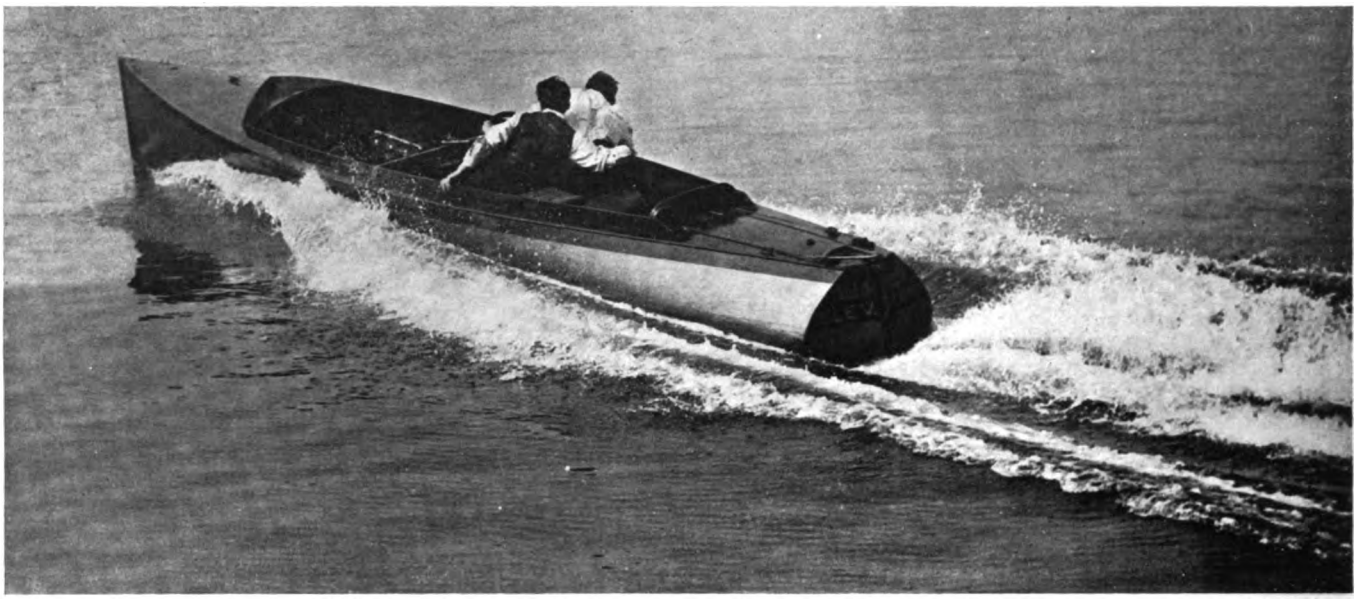


Loew-Victor

struck Pele abaft the rigging and carried away Pele's shrouds and bowsprit. The committee disqualified Edna. Edna's owner appealed and the case was sent to me. The following is my decision:

PELE VS. EDNA

Case against Edna:

First. She was the overtaking boat.

Second. She was to windward.

Under both counts she is at fault, if Pele acted within the rights afforded the overtaken and leeward craft by the two rules:

An overtaken boat has the right of way.

A boat to leeward has the right of way.

But the evidence shows that Pele luffed out of the course not to prevent Edna's passing but to block Edna's passage. That in order to prevent fouling Pele, Edna would have had to come to the wind and assume a position at right angles to the course.

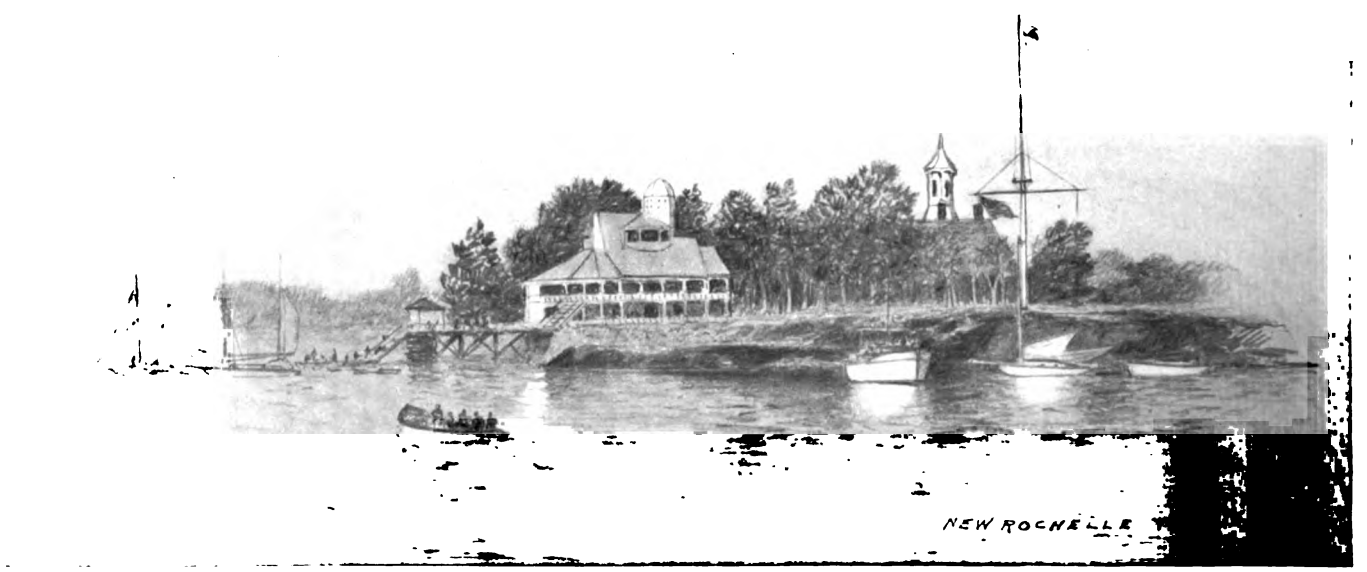
That Pele was carrying a balloon jib and that in order to luff she slackened her balloon jib-sheet, and that had Edna luffed to clear Pele she also would have had to start her bolloon sheet.

A boat to claim the protection of the luffing rule must luff with all her canvas under full pressure and her sheets in proper trim, and must be at all times under full headway and helm control.

The fact that Pele slackened her balloon jib-sheet shows that she was luffing wholly on her mainsail, that her sheets were not trimmed to permit of her assuming a course at right angles to the course between the buoys, and that when struck by Edna she was not sailing but simply moving with her way.

Pele was placed in a position either by bad judgment, or want of skill that made it impossible for Edna to clear her and avoid the foul.

I would disqualify Pele.—[EDITOR.]



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THE RUDDER

DECEMBER, 1910

VOL. XXIV
No 6

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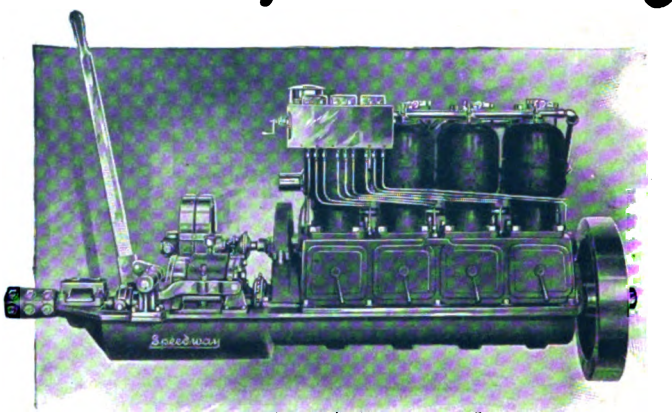

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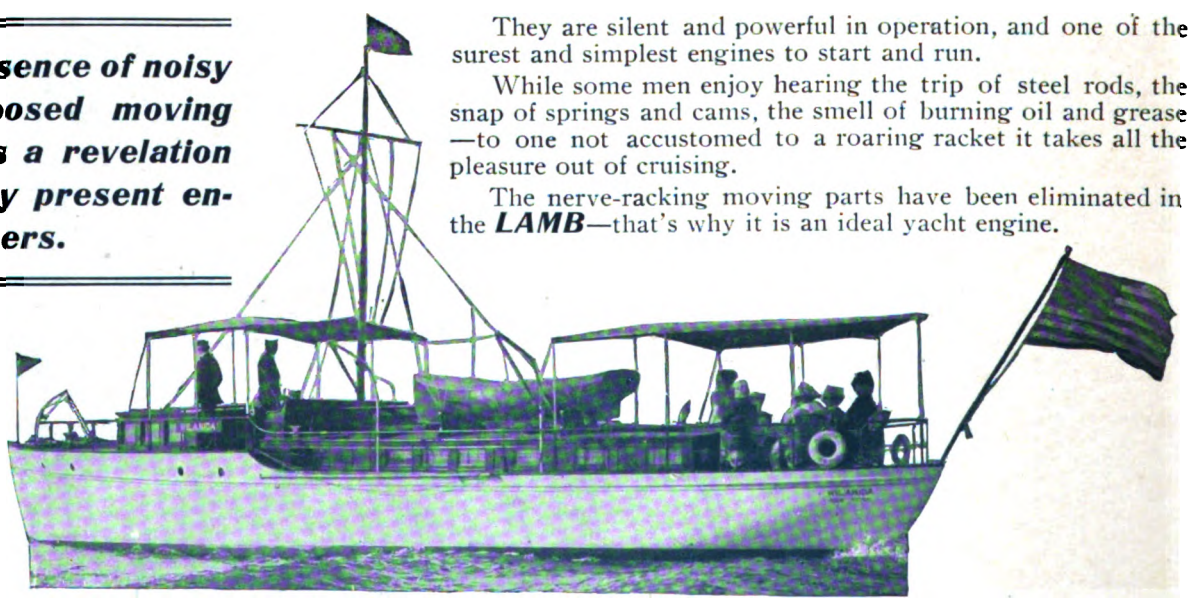
While some men enjoy hearing the trip of steel rods, the snap of springs and cams, the smell of burning oil and grease —to one not accustomed to a roaring racket it takes all the pleasure out of cruising.

The nerve-racking moving parts have been eliminated in the ***LAMB***—that's why it is an ideal yacht engine.

Let us give you a demonstration, then you will better understand the silent features.



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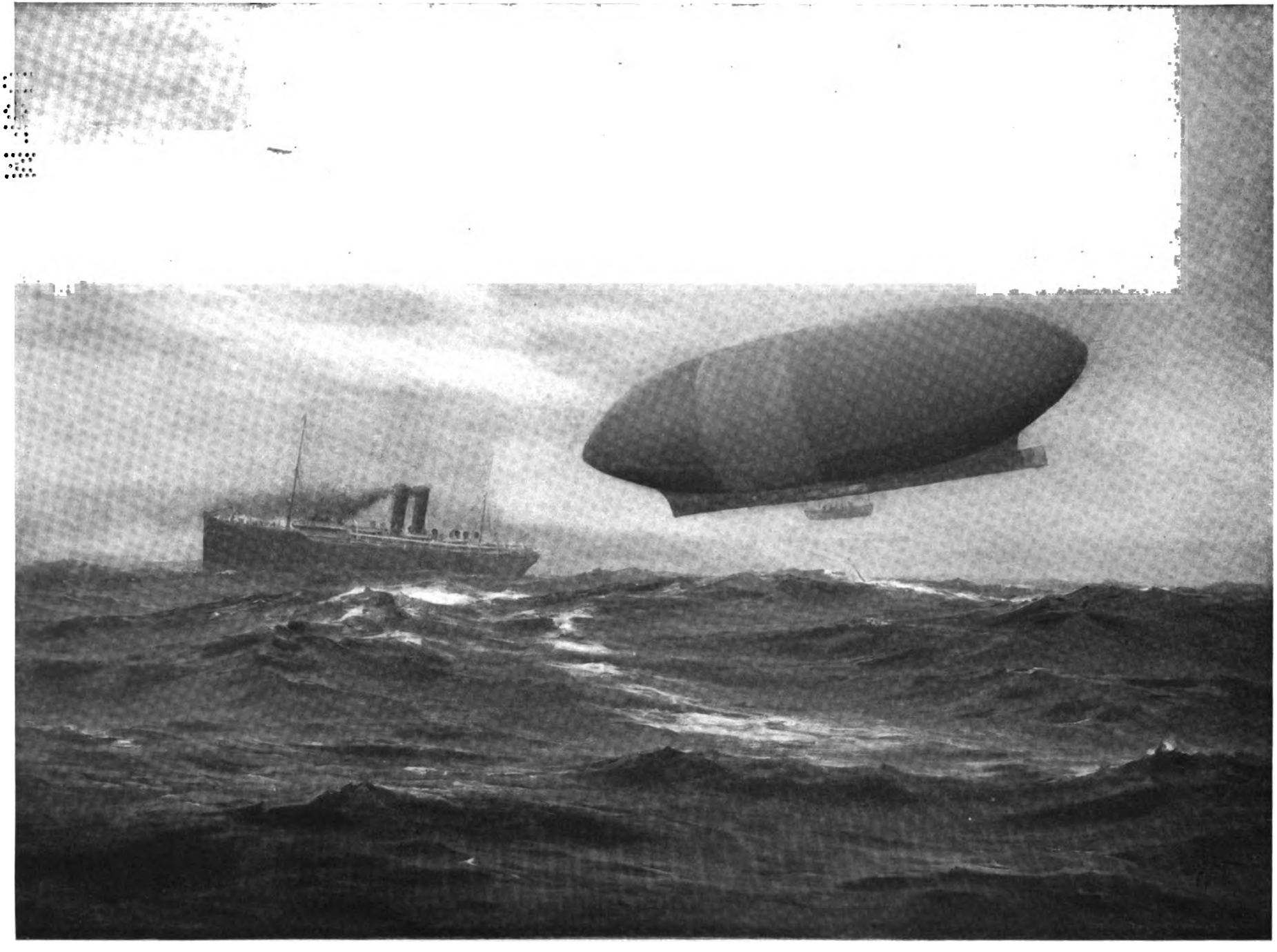

By Warren Sheppard

A Twentieth-Century Rescue

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The Rudder

Edited by THOMAS FLEMING DAY

Vol. XXV DECEMBER, 1910 No. 6

IN THE TRACKS OF THE TRADES

Lewis R. Freeman

Reminiscences of the Fourteen-Thousand-Mile Voyage of the Schooner Lurline Among the Islands of the North and South Pacific

THE Weather Bureau, which for several weeks had been sending out bulletins of the "Possibly Showers" variety, came out unequivocally with "Rain" on the morning of February 4th, and this, no less than the lead-colored curtain that veiled the Sierra Madres and the windy shimmers in the tails of the clouds that went rushing across the zenith before the gushing East wind, made it plain that the elements, not to be outdone by our aimiable friends, were getting together for a special demonstration on their own account in honor of Lurline's departure. The nature of this elemental diversion developed in good time.

Personal good-byes began at the Pasadena station and continued on down through Los Angeles to the San Pedro quay. From there out through the inner harbor bon voyages became general, and from the engineer of the government dredge, who blew his whistle off with the force of his farewell toots, to the deck hand on a collier who, in lieu of a handkerchief, waved the shirt he was washing, everybody took a hand in the parting demonstration.

Rounding the jetty opposite Deadman's Island Lurline was sighted lying a half mile to the westward in the backsweep of the outer bay, and five minutes later our launch was alongside. The crew stood at attention as the Commodore and the score or more of friends who had come along for a final farewell stepped aboard, to immediately after turn to stowing the small mountain of hand baggage that came off with the launch. Soon visitors began arriving from the other yachts of the South Coast fleet, and these, reinforced by several press representives and a number of shore visitors from San Pedro, swelled the farewell party to a size that taxed the standing room capacity of quarter-deck and cabin to the utmost.

Just before the sailing hour arrived presentation was made to the Commodore of a large silver loving cup, and this being filled, each visitor, ere he stepped down the gangway, proposed some appropriate toast and drank to a prosperous voyage and a safe return.

Meanwhile the sail covers had been removed and the stops cast off, and as the last of the friends stepped back aboard their waiting launch all hands tailed on to the main throat and peak halyards and the big sail was smartly hoisted and swayed to place. Foresail, forestaysail and jib followed, and finally the anchor, clingingly tenaciously to the last California mud it was destined to hook its flukes into for many months, was broken out, and close-hauled on the starboard tack to a light breeze Lurline swung off past the breakwater and out of the harbor.

At four o'clock Point Firmin Light, distant five miles, bore N. W. by W., and at the same hour the barometer, which had risen rapidly since noon, registered 30.40. The gentle Southerly breeze cleared the Western sky toward evening and a warm-hued sunset blazed out in defiance of the threatening signs of the morning. The yacht slipped easily through the light swell of the channel, her regular courtesies serving but to spangle her glossy sides with sparkling drops of brine and to punctuate her wake at even intervals with swelling knots of foam like the marks on a trailed sounding line.

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"Fairweather sunset," said the mate; "but —" and he finished by shaking his head dubiously and proceeding to give orders for swinging the boats inboard and adding extra lashings to the spare spars and water butts on the forward deck.

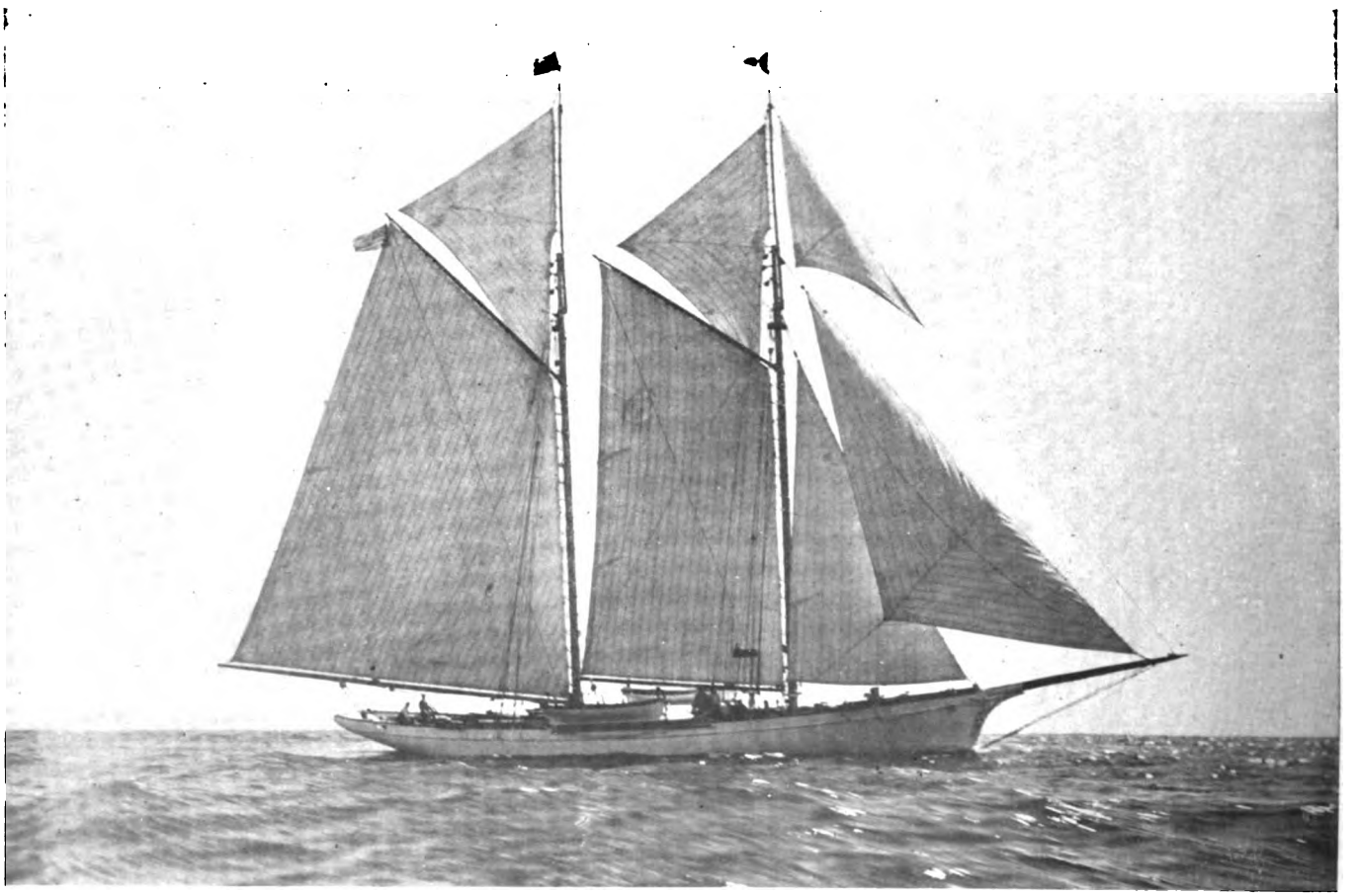
Early in the first watch, and not long after the thin wisp of a new moon had slipped down behind the jagged peaks of Catalina, ten miles to the West and on our starboard quarter, the wind hauled suddenly to the Southeast. Blowing with steadily increasing force, it drove a heavy pall of sooty clouds before it which, quickly spreading across the sky, rendered the night so dark that, beyond the reflections from the binnacle lights, nothing was visible save the phosphorescent crests of the rapidly rising seas. With this slant of wind the best we could do on the starboard tack was dead East, and this direction was held until the imminent loom of Point San Juan and a not overly distant roar of breakers warned us to put about and head off Southwesterly between San Clemente and Catalina.

At midnight the barometer was well below 30, and the wind and sea were still rising. The mainsail and foresail were single-reefed and the jib stowed when the watch came on deck, and while sail was being shortened a heavy sea came aboard just forward of the beam and crashed through the galley skylight. The water rushed in with a roar of a miniature Niagara, but beyond washing the Japanese cook off the transom on which he had composed himself for sleep, and bouncing him against the stove, no serious harm was done.

At two A. M., with no abatement of force, the wind was back to S. S. W., and with Clemente rising darkly ahead the yacht was again put about. The barometer was down to 29.80, and the half-gale that met us as we came out from under the lee of the island quickly made it evident that further shortening of sail was imperative. The watch was called, and with no little difficulty two more reefs were tied in the mainsail, bringing it down to almost the proportions of a storm trysail. The foreboom was being hauled amidships preparatory to close-reefing the foresail when a solid wall of water came combing over the port bow and swept the deck. One of the sailors, a Swede, who had been bracing a foot against the lee rail, lost his balance in the sudden lurch and, missing a frantic clutch at a shroud, went over the side. A rush was made for the life buoys, but before one could be thrown over the lost man reappeared, calmly coming in, hand over hand, on the foresheet, a bight of which he had carried with him in his fall.

After subduing and triple-reefing the threshing foresail the watch went below, but only to be almost immediately called again to take the bonnet out of the staysail, a measure made necessary by the fierce Southwesterly squalls which kept winding into the now fully developed "Southeaster." At four o'clock, as the storm showed no signs of abating, the forestaysail was hauled to windward and, head-reaching, the yacht made good weather of the last hours of the night.

Day broke cold and cloudy and shadowed the bare brown hills of Clemente ten miles distant on the starboard quarter. Heavy seas, unbroken now by the islands, came charging down from the Southwest, but



Lurline in Present-Day Rig. L. O. A. 86 Ft. 3 In. L. W. L. 72 Ft. Breadth 21 Ft. 3 In Draught 10 Ft. 7 In

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so buoyant was the yacht under her shortened sail that the morning light showed the brine of the last wave that had swept her decks before she was put to head-reaching laid in frost-like repouseé along the lee scuppers. Toward midday the wind shifted to Northwest, and though still blowing a gale it was deemed best to risk a little more sail in an endeavor to get away from the islands before night closed down again. Accordingly, the reefs were shaken out of foresail and forestaysail, and under these and a close-reefed mainsail twenty-four miles were run off in the afternoon watch. At four o'clock, when the barometer touched its minimum of 29.70, a nasty swell from the Northeast, due to another shifting of the wind, began to make itself felt, and, although nothing carried away, the vicious twist of the cross surges made so bad a seaway that we were forced to reef down again and ride out the night head-reaching in a South-southwesterly direction.

By the morning of the 6th the gale had blown itself out, and at eight o'clock all the reefs were untied and the yacht appeared under all plain lower sail for the first time since the evening of departure. Toward noon the clouds began to break up and let through streaks of pale sunlight to dapple the olive-green hollows of the sea with patches of golden yellow. The chill of the air gradually melted away as the day advanced, and the opportunity to open skylights and port holes was warmly welcomed by the ladies who had been kept to their cabins for nearly two days. The main topmast staysail and the main gaff topsail were set at noon and carried until a heavy squall, working down from the Northwest just before dark, was responsible for sending them down by the run. The runs to noon of the 5th and 6th, respectively, were sixty-three and ninety miles, in a course that approximated W. S. W.

Fair weather and light breezes were taken advantage of on the morning of the 7th, to install a badly needed improvement in the form of a wire rail run all the way around the yacht at a height of eighteen inches from the main rail. The latter, only two feet in height, while of some protection at the bows and stern, was almost useless amidship where the deckhouse, separated from it by only a narrow passage, rose to an equal height. Three-quarter inch steel stanchions were set at intervals of eight feet along the rail, and through these a quarter-inch wire cable was run. The stanchions were fastened with a bolt on the under side of the main rail in such a manner as to be easily removed, thus permitting the whole affair to be expeditiously taken down and stowed while in port. This simple and inexpensive contrivance proved of incalculable value in insuring the safety of the decks on stormy nights, a usefulness which was put to the test many times in the course of the months that followed.

The run to noon of the 7th was 122 miles, and on the 8th, 124. Little sea was running on these days, but light and baffling winds and occasional squalls made the constant setting and lowering of the light sails of rather more trouble than they were worth in the short intervals they could be carried. Our course was at first directed somewhat more Southerly than the straight one to Hilo in the hope of the sooner intercepting the Northeast Trades, which, according to the government weather charts, should be met with somewhere in the vicinity of the 27th parallel. During the morning watch of the 8th our expectations appeared to be realized. Just as the rising sun broke through a shoal of silver clouds a crackling breeze from E.N.E. came humming over the taffrail, and, heeling the yacht over until the hissing brine curled off by her forefoot kissed the starboard rail, sent her spinning through the water at a good ten-knot gait.

"Northeast Trades!" chuckled the starboard watch to the port watch as the latter came on deck. "Northeast Trades—cheer up, the Hilo girls have got the tow line!" "Northeast Trades—now for a big day's run!" said the mate to the captain as he ordered the kites run

Farewell Party on Board Lurline at San Pedro Cal.

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up and the backstays set and tautened; and "Northeast Trades!" mused the cook to the bacon; and "Northeast Trades!" chirped the ladies to their mirrors; and "Northeast Trades!" hummed the sails to the sheets and the halyards to the shrouds. The air was vibrant with the good news, the sea was adance because of it, and the sun, when he awoke to a full realization of the import of what was on, broke out into a smile so expansive and warm that the morning mists took up their tents and hurried away.

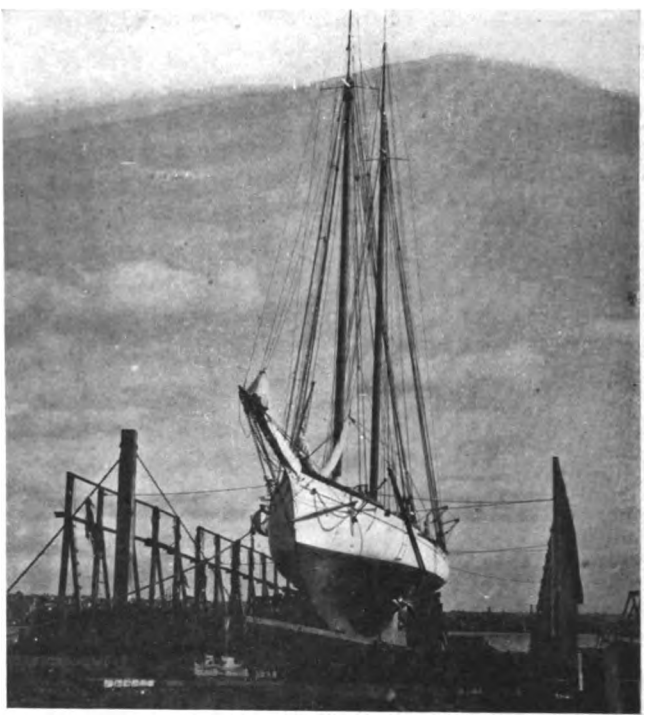
This felicitous state of affairs lasted until 8 o'clock, when the wind veered around through East and South to finally settle itself comfortably so near S. S. W. that it kept the headsails flapping and mainsail ahiver at the mast to hold the yacht's head up to W. S. W., a good two points North of a course which, normally, we could have sailed "wing-and-wing." And that was the last we saw of the much-vaunted Northeast Trades until, five months later on the run back to Hawaii from Fiji, they met us at the equator and headed us all the way to Honolulu.

For the remainder of the run the breeze, except in occasional squalls, blew steadily and with moderate force from all points between Southeast and Southwest. Several times, for a few hours at a stretch, it hauled around as far as W. S. W., and even West, on which occasions the booms were jibed to port and a few miles of the much-needed southing run off. A half-dozen times we ran free for an hour or two when a favorable slant of wind offered, but oftener it was "full-and-by" or "by the wind," with the booms almost amidships in an endeavor to steal the last fraction of a point from the obstinate turncoat of a wind. Most of the time the yacht was too close to the wind to admit of the advantageous use of a main topmast staysail, but either our large or small sail of that class, as well as the club and jib topsails, were used whenever opportunity offered.

Runs of close to 190 miles were made on the 9th, 13th and 14th, and on the 19th the best run of the passage was logged 198 miles. On the 16th and 21st frequent squalls and light, baffling airs were responsible for the shortest runs, fifty-seven and seventy-seven miles respectively. The average for the other days was in the vicinity of 130 miles. The general direction of the currents encountered was unfavorable, the prevailing one, which had a Northeasterly set of about ten miles a day, having apparently booked up with the contrary winds to cut down our southing and westing. Long before entering the torrid zone, which was done on the night of the 19th, the weather, in its fitful uncertainty as well as its mildness, savored strongly of the tropics. There was no fog, nor even the shortest periods when the sky was completely overcast. There was only one occasion when the sky was sufficiently obscured to make a latitude sight impossible at noonday, and no day whose morning was too cloudy for a longitude observation but what made amends with a clear afternoon.

No heavy seas were encountered after the storm of the first two days had been left astern. This was principally due to the fact that the constantly shifting wind never blew up a good sea from one direction before it veered off to another and beat it down again. The resulting succession of cross swells was annoying, but never heavy enough to be really troublesome. The temperature of the water increased slowly but with almost absolute regularity as we approached the lower latitudes, while that of the air, though likewise increasing, was more variable, tending to jump up and down incessantly in the intervals of sunshine and squalls.

On the morning of the 15th an unusual and striking arrangement of clouds on the Western horizon was responsible for no small excitement. A dull, dark line of stratus hanging low along the water was topped by a vivid, clean-lined triangle of frosty-white cirro-cumulus, producing an effect so wonderfully like a snow-capped mountain that the mate, a sailor of life-long experience, without stopping to reflect that our position at noon of the previous day left us still almost a thousand miles from Hawaii, the nearest charted point where even so much as a rock pushed above the bosom of the Pacific, broke forth with a lusty cry of "Land on the starboard bow!" The "Ladies' Log," a diurnal record of feminine *impressions de voyage* collaborated upon the gentler portion of the passenger list, thus alludes to the episode in question: "Calm above and below; inside and out. Sud-



Lurline on the Ways at San Diego Just Before Sailing for Hawaii

denly from the lookout at the masthead came the shrill shout of "Land ho!" and Vice-Captain Wolfe surged to break the news to—and incidentally the sleep of—the "Ancient" (The Commodore) who was just off watch. Latter rushed on deck, clad principally in a startled expression, to behold upon the horizon a thin streak of Fracto-Nimbus superimposed above an oily expanse of saline aqua pura. Some words passed between the officers, most of them going in one direction."

Our landfall on the morning of the 22nd came in form so similar to the cloud island that had deceived the mate a week before that every one gazed, silent and mistrustful, and waited for someone else to shout the news. Our dead reckoning showed us over a hundred miles offshore at daybreak, and it seemed impossible that even the mountain tops would show so clearly at so great a distance. But as the morning sun gained strength the dull sheets of stratus along the horizon began to thin, and gradually out of the dissolving mists, clear as cut ala-

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baster against the deep blue of the tropic sky, the funicular cone of a great snow-capped volcano took unmistakable shape, and we knew it for the mighty Mauna Kea, famous as the loftiest mountain peak on any island in the world.

"Could we make Hilo by dark?" was the question. The mate answered in the negative and advised proceeding under half sail and standing off-and-on till daybreak. But the Commodore, noting the strengthening breeze which since midnight had been working back into the East where it belonged, deemed the effort worth asking and ordered the sheets slacked off and more sail set. Up fluttered the big main topmast staysail, up the jib topsail and the flying jib, and up the main and fore gaff-topsails, every one of them drawing beautifully in the steady E. N. E. wind that came gushing over the starboard quarter, and each after the other, as it was hoisted and filled, doing its full measure of work in forcing the yacht's lee rail farther into the yeasty run of foam churned up by her lunging bows and driving her faster toward her goal.

When the great turtle-backed Mauna Loa, lying to the South and beyond Mauna Kea, was sighted at noon we had been bowling along for three hours at a gait that had brought the black lava belts below the snowline above the horizon, and below these, still indistinct and dim as the figures on ancient tapestry, the perspectives of the gently undulating lower reaches of the windward slope of the big island.

All through the afternoon watch the wind freshened until, from an average of ten knots in the morning, we increased to eleven in each of the hours from twelve to two, ran just over twelve knots from two to three, and but slightly under thirteen from three to four. Fortunately such sea as was running was with us, and though there was a constant smoke of spray about the bows, and though the sails, filled hard as sand bags, strained on the masts till the backstays sang like overstrained fiddles, no green water came aboard and nothing carried away. At four-thirty the masts of ships were sighted a couple of points off the port bow and taking in the light sails we headed up for what we knew must be Hilo harbor. Ten minutes after the course was altered a black squall which had been chasing the yacht passed astern of her and broke upon the land, its course being as clearly traceable across the velvet verdance of the waving cane fields as across the heavens. Down the coast it raced with us, gradually passing inland and leaving behind it a wake of freshness that glistened like a green satin ribbon in the last rays of the sun that was setting behind a shoulder of the towering Mauna Kea. There are several experiences in life that mark with indelible impression the pages of memory, but none to compare with the sensations that throng upon you at your first close-in sight of a tropical island of the Pacific.

"Full-and-By" on the Run to Hilo

Getting a Reef in the Mainsail

As we stood into the entrance of Hilo harbor, which is little more than an open roadstead partially protected by the submerged Broom Reef, the wind hauled to the South and several short tacks were necessary to make a favorable anchorage that offered a couple of cable's lengths to landward of a big 12,000-ton steamer of the American-Hawaiian fleet which was loading sugar. The anchor was let go in seven fathoms of water at a few minutes before six o'clock, the log which had been taken in at the entrance of the harbor registering 2430 miles from San Pedro breakwater.

Of Hilo itself, of its kind and hospitable people, of its great sugar mills, its unique and interesting Japanese quarter, and its avenues of palms and mangoes and its streams and waterfalls, this brief record affords no space to write. Further along on the cruise there were occasions when we met with more sumptuous entertainment, saw harbors more picturesque and better protected, and mountains clothed in an even more reckless roit of tropical vegetation, but we found no place that ever seriously rivalled Hilo for first place in our hearts; it was our first love; our first tropical experience; the gateway to those mystical latitudes of enchantment, the South Pacific.

During the ten days which Lurline laid in Hilo Bay visits were made to Kilauea, the largest active volcano

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in the world, to the peerless Onomea Gulch and to several interesting sugar mills and plantations. Our stay was a continuous round of "luaus" or native feasts, luncheons, dinners, teas and drives. On the yacht we entertained with several small dinners, an evening of fireworks and music, and an afternoon sail, the latter event being recorded in the irreverent "Ladies' Page" as a "Mal de Mer Party."

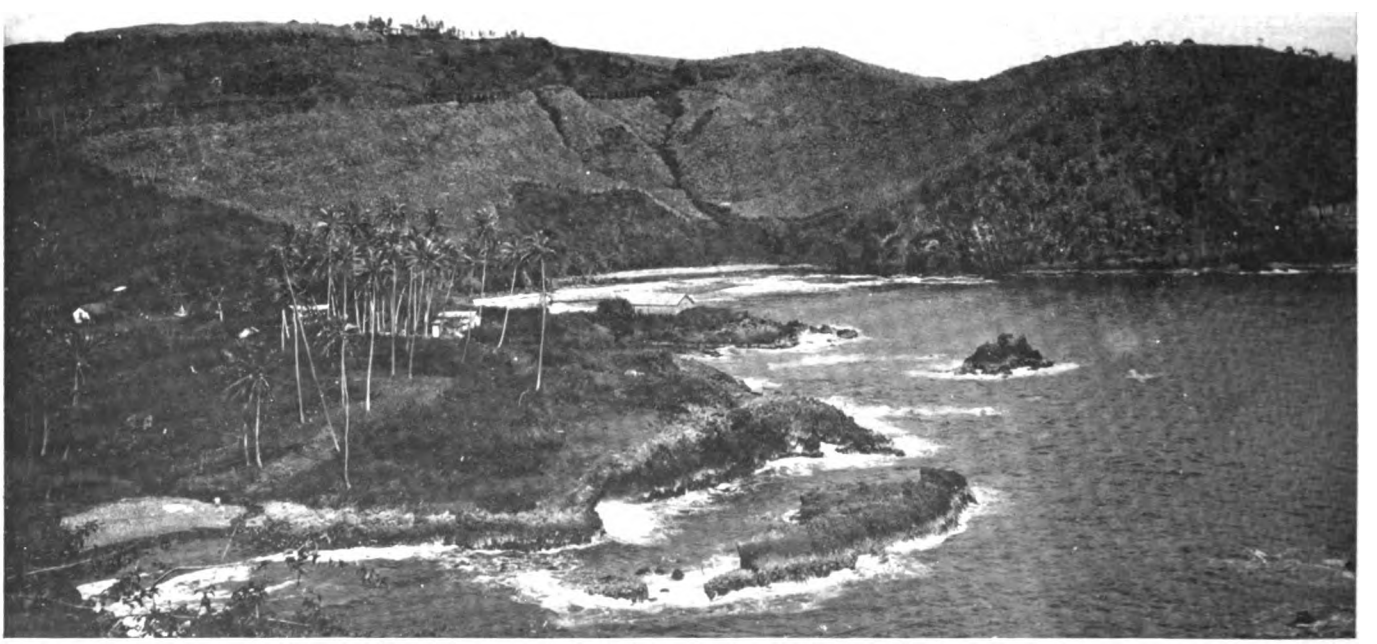
Early in the afternoon of the 26th two of the sailors, pulling ashore to bring off some visitors, were caught in a nasty combination of surf and tide rip at the bar of the Wiluku River and upset. One of the men was caught under the boat, and but for timely assistance of a Japanese who had been fishing from his sampan nearby, would undoubtedly have been drowned. While the plucky Jap was endeavoring to secure the painter of the overturned boat his sampan drifted inside the breakers and was on the verge of being itself upset when rescued by a tug sent out from the landing stage.

At four A. M. of March 2nd anchor was tripped and sail made for the run to Honolulu. The wind at first was light and baffling, as a result of which but twenty-one miles up the coast of the island were run off by noon. After passing Alea Point, however, the change of course made it possible to slack off the sheets, and under all plain lower sail the yacht bowled along at a nine-knot gait until eight in the evening. For the next three or four hours heavy squalls were encountered, but midnight showed a clear sky with Maui, looming darkly, abeam to starboard. This big island, the second in size of the Hawaiian group, is famous for its extinct volcano of Haleakala, the crater of which, ten miles in diameter and with rims that rise in places to an altitude of 10,000 feet, is believed to be the largest that has existed in any era of the world's geological history.

Morning of the 3rd showed the gaunt, forbidding cliffs of Molokai on the port beam, and our glasses readily located the spot where, shut in by unscalable rock wells behind and cut off by the sea in front, the unfortunate inhabitants of the leper settlement of Kalaupapa drag out their sad existences.

The island of Oahu was sighted at nine, and shortly afterward we headed into Molokai channel, said to be one of the deepest places in the Pacific ocean, and, in the matter of winds and waves and currents, undoubtedly one of the most treacherous and uncertain. A strong breeze increased to a half-gale by noon, and under double-reefed main and foresails the yacht made none too good weather of it in the vicious cross tumble of waters that assailed her. About noon the smooth, round summit of Coco Head began to peer above the foam-tipped crests of the in-racing seas, and an hour later the sharp, incisive outline of Diamond Head showed clearly against the Northeastern sky. As we brought its tall lighthouse abeam the beach and reef of Waikiki, and rows of white hotels and bungalows, and the odd-looking crater of the Punchbowl tilted above Honolulu in the background, began to open up beyond. The Jack at the fore brought the pilot boat, rowed by a crew of stalwart, bare-chested Kanakas, out from the Head through a tortuous passage in the Reef, and, watching his chance, the pilot gained a footing on the ladder and clambered aboard without absorbing so much as a drop of the swinging comber which at the same instant swept and half swamped his plunging whaleboat.

Our next three miles to the entrance of Honolulu harbor was the same as that of the Pacific liners, and the unfolding panorama, like the unrolling of an ever-changing piece of rich Oriental brocade, has been too often described by pens more facile in expression than the blunt point which here rewrites the log of Lurline



Onomeo Gulch, Hawaii, Visited by Lurline

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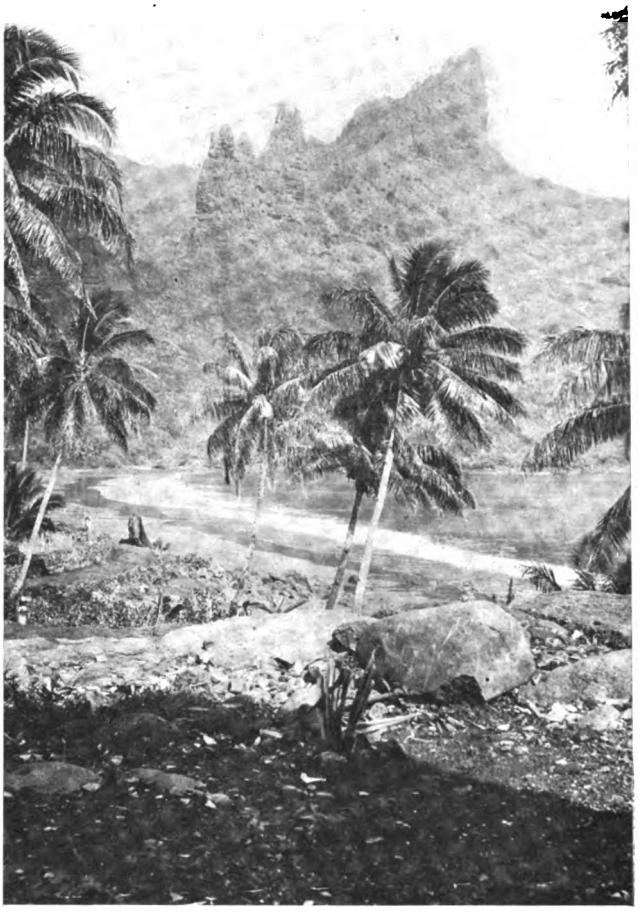
to make the endeavor anything but out of place in this record. I have seen Honolulu and the beach of Waikiki a good many times since our first entrance, but I always like best to think of it as it impressed me on that gusty afternoon, a harmony in blues and greens—the somber indigo of the cloud-shadowed sea, the lapis lazuli above the reefs, the sheeny verdancy of the palms and bananas along the foreshore, the *verte emaraude* of the slope up to where Tantalus and the Pali were lost in their crowns of cumulus and nimbus, and above all the transparent azure of the tropic sky.

The pilot took Lurline in through the narrow rift which constitutes the entrance of Honolulu harbor under foresail and jib, handling her with consumate skill in the maze of cross currents and eddies which make the passage a dangerous one even for steamers. Immediately on gaining still water we were boarded by the harbor master, who moored us neatly and expeditiously in a natural slip in the reef called "Rotten Row," scarce a cable's length from the docks of the Pacific Mail and the Australian liners. Here the yacht laid for three weeks, provisioning and refitting for the arduous months ahead in some of the almost unsailed corners of the South Pacific, while we—the Commodore and his passengers—lived ashore, enjoying to our utmost the hospitality of the gayest, richest, loveliest and most fascinating of all the Pacific island capitals.

With 2,000 miles of salt water rolling between its windward shores and the Western coast of North America, with twice that distance separating it from Asia, and with more or less open water stretching limitlessly away to the Arctic and Antarctic, it is only natural that Hawaii should harbor a race of sea-loving people. A hundred years ago the Hawaiians, bred true to their Samoan progenitors, fearlessly embarked in voyages in their silver-like, cinnet-sewed canoes that to-day would be deemed hazardous for hundred-ton traders; and a half century or more back they were hailed throughout the Seven Seas as the most daring whalers that ever hurled harpoons or drove lances. So in assuming at the beginning of this century the title of "The Yachting Center of the Pacific," Hawaii is not attaining to a new distinction, but merely claiming in a modernized form a heritage of ancient days.

Honolulu, judged by the "timber and lines" of the men behind the sport there, is the peer of any yachting center in the world, and the Royal Hawaiian Yacht Club is composed of as clean-cut, whole-souled a lot of gentlemen and sportsmen as one will meet East, West, North or South, in whatever country or under whatever burgee.

Kaleakaua, last king of the Hawaiians, was the first commodore of the yacht club, and to-day Prine Cupid, once in line of ascent to the throne, is an active member. And only in the yacht club, of all Hawaiian organizations, has royalist and reactionary met on terms of frank and open friendship. The memories of the stirring days of the revolution are dimmed by the mists of close to a score of years, but still clear and distinct in island society is drawn the line of demarcation between the ever loyal one-time adherents of Kaleakaua and those who were active in, or in sympathy with, his overthrow. Yet with the yachtsmen, even in the days of the by no means bloodless revolution, animosities, political, social and personal, were ever left ashore, and one saw leaders of the rival factions bending their backs and chorusing together as they broke out the same anchor, or, shoulder to shoulder and foot to foot, swaying up the same mainsail.



Bay of Hatchein, Marquesas Islands Characterized by the Few Dozen White Men Who Have Seen it as the Most Beautiful Spot in the World

One of the stock stories they tell you at the yacht club is of an incident which occurred back in the days immediately preceding the revolution, a time when rumors of plots flew thick and fast and royalist and republican passed each other in highway and byway with distrustful, sidelong glances, each with the fingers of his left hand raised to his hat in courteous salutation and the fingers of his right hand twitching on the butt of the stubby forty-four in his hip pocket. It chanced at this time that Sanford B. Dole, prominent from boyhood in island affairs and then at the head of the conspiracy to overthrow the monarchy, and Clarence McFarlane, brother of the King's Master of Ceremonies and staunch supporter of the throne, were sailing mates on the old "Aloha," a trim forty-foot sloop designed and built by Fife and brought out to the Islands on the deck of a sailing ship. On the occasion in question Aloha had just cleared the passage and sheets were being slacked away for the run before the blustering Northeast Trade down to Maui. A sudden lurch of the boat caused Dole to lose his hitch on the bit, the sheet was jerked from his hand and in lunging forward to regain a hold his patriarchal beard—nearly two feet in length and then, as now, his most distinguishing feature—whisked into the block and started to wind upon the whirling sheave. Slammed to the deck and in imminent danger of serious injury the moment his chin met the block, Dole's most frantic efforts had hardly more than checked the run of

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A Hawaiian Guest Who Succumbed to the Roll

the sheet, when McFarlane leaped forward, jammed his limp fingers in above the sheave, and at the expense of a badly torn hand stopped its deadly rotation until Lorrin Thurston, at the wheel, brought the yacht's head to the wind. Two days later the revolution began which made Dole President, Thurston Minister to Washington, and left McFarlane, politically, in obscurity. Yet these three still sail together now and then, and during our stay in Honolulu we of Lurline, both ashore and afloat, enjoyed their joint yachting reminiscences on many memorable occasions.

To read over a membership list of the Royal Hawaiian Yacht Club from its early days is to con a roster of the men who have made Hawaii what it is; and not a man who has held the tiller of the ship of state and guided it through the storms that have threatened to engulf it during the last three decades but has owed something of his steadiness of head and hand to the training of his yachting days.

Gentlemen of the Royal Hawaiian Yacht Club, I salute you. Here's to your summer seas, and summer skies, and summer winds, and the summer in your hearts. May you always have—I was going to say fair weather and other things to match, but I pause in time. Yours are the natures that make fair weather out of any storm that blows. So here's to a sail above you, a plank beneath you, the blue-green Pacific about you, and the boisterous Trade wind blowing you on.

The only unpleasant feature about letting go anchor in Honolulu harbor is having to break it out again. After our week of scheduled stop had stretched out to two weeks, and finally to three, the realization that our reluctance to leave was but growing with every day that the inevitable moment was deferred, brought us at length to the arbitrary setting of a sailing hour. Toward this we inflexibly directed the current of our resolutions, with the result that we finally got away.

On the morning of sailing we were pleasantly surprised to receive word from the Spreckels Company—Mr. John D. Spreckels was the original owner of Lurine—that it was sending its big tug, Fearless, to tow us out of the passage and beyond the lee of the island to the breeze-swept channel. A little later a note came out from Governor Carter informing us that he was sending out the Royal Hawaiian Band on the Fearless to pipe pæans of farewell.

We were not sailing until three o'clock on the afternoon of the 24th of March, but soon after daybreak boats commenced coming off laden with boxes and bags and parcels, remembrances from our kindly Island friends, and toward noon the tide of the flowers set in—these mostly in the form of *leis* or garlands to be worn about the neck. By two o'clock the cabin was like the shipping room of a department store at Christmas time, and the deck a cross between a fruitstand and a conservatory. Nor was the forecastle unremembered. The sailors, too, appeared to have formed attachments. As the bluff bow of the Fearless came nosing out into the stream from under the stern of the giant Siberia and all hands turned to on the anchor, we were treated to the novel spectacle of four brawny seamen, garlanded and festooned in trailing *leis* from head to heel, bending and swaying in unison and heaving up the chain to a chantey that was nothing more or less than an improvisation from a rollicking native *hula*.

The line from Fearless was passed aboard and made fast, and as the anchor was broken out the white-coated band grouped picturesquely on the forward deck of the tug struck up the opening bars of a familiar air, and Puilani Molina, the sweetest singer in all Hawaii, advanced to the rail, tossed a bright hued lei upon the water and began singing that most plaintive and tenderly sweet of all farewell song, "Aloha-oe."

"Ha-a-heo ka-u-a-ina pa—li—."

Liquid silver, the full, clear notes floated to us across the water, and from reef to shore the whole bay fell silent as she sang through the first verse. At the first words of the chorus a score or more of friends clustered on the hurricane deck of the tug joined in. Instant the air was taken up by the deep-voiced bandsmen; then by the deckhands and grimy stokers gathered at the doors of the engineroom, and then by the boatmen as they laid on their oars in the offing, until finally it reached the shore to come back to us in broken snatches from the throats of the crowd that lined the quays and landings.

"Aloha-oe, Aloha-oe,
E-ke o-na-o-na no-ho i-ka li—po,
A fond embrace—A ho-i a-e-au,
Until we meet again."

Then the screw of the Fearless began revolving, her tautening hawser swung Lurline into line astern, and out through the narrow passage in the reef we were trailed in the bubbling wake of the speedy tug. An hour later, with Coco Head abeam and Diamond Head bearing N. E. by N., five miles distant, sail was hoisted, the towline cast off, and Lurline, wing-and-wing to a light Northwest breeze, courtesied gracefully to the rising swells of the channel and took the first mincing steps in her long dance to the Marquesas.

The Rocky Entrance to Taiohai, Marquesas Islands

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Queen of Taiohai Putting Off to Visit Lurline

As we filled away, dipping our flag in a farewell salute, we saw the band, which since leaving the harbor had been doing its bravest to lift the sodden pall of parting with rollicking Kanaka airs and stirring patriotic selections, again stiffen to attention, and down the wind, despairingly, appealingly, soothingly by turns, as though wafted by the tug's broadside of fluttering handkerchiefs, came for the last time the strains of "Aloha-oe." There are many forms and fashions of the sweet sorrow of parting of which the poet sings, but for a long, long pull, with a yo-heave-ho, at the heart strings, nothing like "Aloha-oe" with the tow-line in the water, the odor of *Ilima leis* heavy in the nostrils, and the skyline of fair Hawaii blurring dim through a mist of tears.

The course from Honolulu to the Marquesan island of Hukahiva is about S. E. by E., but in order to run as little chance as possible of being headed by the Southeast Trades after crossing the Line, it was deemed best to lay our course a couple of points to the East of this until the latitudes of the Southern wind were reached and its prevailing direction at that season more accurately determined. This course we found we had managed to approximate at the end of two weeks' sailing, but only at the expense of being constantly on the wind; then to discover that the Trades in the South Pacific blow steadily between E. S. E. and East for nearly all of the year. This meant that we had put ourselves to a good deal of unnecessary trouble and made but a moderately good run where we might have made a very speedy one. That from Hawaii to the Marquesas is one of the few long runs in the Pacific where the most direct course is the fastest.

The bleak rock of Lanaii loomed abeam to windward for several hours on the night of the 24th, and morning showed the dim blur of Maui's great crater, Haleakala, against the Eastern sky. At noon the snowy peaks of Mauna Kea and Mauna Loa detached themselves from the fleecy cloud racks down to E. S. E., and steadily loomed higher as the sun declined. In the first watch the wind began falling lighter, by midnight it was only coming in fluky puffs, and at daybreak Lurline found herself in the most windlessly somnolent patch of salt water in all the length and breadth of the Pacific, the lee of the 13,000-foot volcanos that form the backbone of the island of Hawaii.

Probably no other place in the world presents such striking contrasts of meteorological conditions between almost contiguous points as that furnished by the windward and leeward sides of Hawaii. The lofty summits of its volcanos tower so far above the raincloud line that practically no moisture whatever is able to pass to a large belt on the Southwest side of the island, and where the annual precipitation in the vicinity of Hilo is occasionally in excess of two, and even three, hundred inches, that of the Kona coast ranges from absolutely nothing to but five or six. The tropical verdure of the windward side is unknown in this windless and rainless belt, and save in places where the streams from perpetual snows form threadlike oases, this leeward slope is largely desert.

The windless area behind the volcanic barrier of Hawaii may be roughly defined as a triangle, sixty miles wide at its base, and tapering off to an apex a hundred miles or more off to leeward. It was well down toward the base of this triangle that we were trying to cross in an ill-advised endeavor to avoid the alternative of sailing the longer course to the windward of the island. Morning of the 26th found us in a clear, mirror-like, unrippling sea, the surface of which, in its absence of motion, might have passed for that of a great fresh-water lake. Scarcely a suggestion of swell underran the satiny sheen of the level sea, and for all the motion to her decks the yacht might have been chocked up in a dry dock. The booms, hauled in amidships, lay as though spiked to the deck; and even the drowsy slatting of the lazy lines and the brisk tattoo of the reef points, twin lullabies of the so-called calms of livelier seas, were unheard. The log, as though in emulation of a sounding lead, hung perpendicularly from the taffrail, its brass blades showing no less clearly in the lucent, unwinking depths than the feathery weed that fringed the motionless rudder.

Toward noon a few faint leakings of wind came edging in around the North shoulder of Mauna Kea and for some time we had steerageway enough to allow the yacht to flap and drift along at a mile or so an hour, the booms out now on one side and now on the other. By six o'clock these vagrant puffs had ceased, and as twilight followed the sinking of the sun behind a ruled-line horizon calm succeeded to calmer, until the sails were finally taken in and we floated, lazily waiting, on the heavily breathing bosom of the deep, for now the shadow of a swell was running and imparting just enough motion to the yacht to set her rocking drowsily to and fro in accord with the somnolent peacefulness of the tropic night. The afterglow kindled and faded in pale tints of amber and amethyst and dusky olive, and almost up to the zenith a filmy mass of cirrus cloud, torn by conflicting air currents too high to make themselves felt below, flamed up in the reflected light for an instant and then broke and scattered into bits, like rose leaves showered into a shaft of red calcium. Across the still expanse of the sea East nodded to West, North nodded to South, the sky stars blinked at the sea stars, and the sea stars blinked crookedly back; and under all ran the indolent ebony swells, drowsing and catching themselves and drowsing again.

Early in the middle watch a light breeze stole out again from landward—this time apparently coming from the Mauna Loa slope of the island—and by daylight we were twenty miles nearer the Southerly dead-line of the windless triangle. Then the puffs began falling light again, and for an hour or two we drifted without steerageway ten or a dozen miles of the entrance to the beautiful little bay of Kealakekua. With eyes straining

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Nuka Hiva a Marquesan Trader

through our glasses some of us fancied that we discerned the outlines of a tall shaft of white shining through the brown boles of the cocoanut palms, and told each other that we were gazing on the monument that marked the spot where Captain Cook, after innumerable hair-breadth escapes in every important island group of the Pacific, fell under the clubs of the warlike Hawaiians, fighting no less desperately to save the lives of his comrades than his own.

One would have to cruise the Pacific for a lifetime to begin to come to an adequate appreciation of what the Great Navigator did, for the more one sees the more stupendous seems the sum of his achievement. From where the sub-Arctic waters wash the shores of Cook's Inlet, Alaska, to Cooktown, in the lap of the Antipodean tropics, and Mount Cook raising its glacier-seamed sides above the bleak bluffs of New Zealand, there is hardly an important island whose strand his foot did not press, and scarce a lump of coral rearing its head above the restless Pacific surges that his eye did not sweep. Nasty sailing, you think it, in these days of charts and steamers, when the life-boats are swept from the hurricane deck off Cook's Inlet on your run to Nome; and a frightful hole, you say, when your "N. Y. K." liner anchors every night as she feels her way along the Great Barrier Reef, and every minute is your last, perhaps you think, when your "A and A" steamer is hove to in a Fijian hurricane, or you're locked in the cabin of your "A. U. S. N." packet in a spell of "Southeast" weather between Dunedin and Sydney. Distinctly bad, you think all this; you on your 6,000-ton steamer that is equipped with every precautionary and safety device known to science, with a powerful beacon on every headland and the bottom of the sea mapped out like a block of lower Broadway. Just try and imagine, then, if you please, what these same places must have been to Cook, who spent years among them in crazy old wooden ships, scarcely a one of which but ultimately ended by piling up on some rocky shore or coral beach. Columbus, Vespucci, and the rest of the deep water navigators, simply turned the noses of their ships West and sailed until they got to somewhere—and then sailed back. Cook spent years with a man at the masthead looking for hidden reefs and with the sounding lead going every hour of the twenty-four.

In my own mind there are grave doubts as to whether any of us really saw the Cook monument at any time during that long forenoon that we lay becalmed off the Kona coast of Hawaii—in fact, I have since been told that it is not visible from the sea at all—but the sight of Kealakekua—yes, even at a distance of a dozen miles, or more—is sufficient excuse for this slight tribute to one who none that has sailed the Pacific will deny was the Greatest Navigator of Them All. Captain James Cook, sailor, diplomat and gentleman, here's long and unbroken rest for your watch below in the quiet haven where you let go Life's anchor in the shadow or towering Mauna Loa.

A fluky three to five-knot breeze drew in from the E. S. E. about mid-day, every puff of which was taken advantage of to struggle on out of the lee of the island. Freshening slightly after nightfall, it carried us along at a little better than four-mile gait during each hour of the first watch, near the end of which it hauled ahead and forced us off to Southwest until enough southing had been run off to allow us to go about on the other tack without danger of butting the yacht's nose into the volcanic bluffs of Hawaii. Shortly after midnight the mate awakened the Commodore to report a reflection on the sky off to the Northeast, which he believed to be from a burning ship, an announcement which brought every one tumbling out on deck in short order. There was the reflection, surely enough; a dull-red glare on our port quarter that shone and dulled and shone like a blowed-on ember. The light was in line with the place where the opaque mass of Hawaii blotted out the tail of the Great Bear, and because there was no sign of fire on the water we had about come to the conclusion that the glare might come from a ship or sugar mill burning on the windward side of the island, when the reflection suddenly flared from a dull cherry to a vivid flame-red, to be immediately quenched in tumbling masses of smoke or steam which went shooting up into the air as though driven by the force of a mighty explosion.

"She's a steamer!" yelled the mate. "Them's her boilers a-bustin'." Whereupon we all fell to speculating as to what particular steamer it might be. And it was not until six or seven minutes later when a great, deep-toned reverberation reached us, a sound so mighty that all the steamers in the Pacific blowing up together would have been faint beside it, that light finally burst in upon us and we broke out in chorus with "Kilauea!—in eruption again."

The actuality of this eruption—only a slight one as it chanced—we verified six weeks later when we received our file of San Francisco papers in Tahiti. In referring since to this most spectacular piece of volcanic pyrotechnics we have always done so in the words of one of the ladies, then a recently emancipated prisoner from the grip of mal de mer. In the sentiently suffusing light the sea rolled a dark pit of ox-blood and the heavens arched a vault of purple-black studded with pale emeralds, the stars. The half-filled sails were hangings of amethyst silk and the masts lances of fire grounded among patches of living flame where the brasswork threw back the rosy glow of the Northeast.

"Look! look!" cried the sufferer, clapping her hands as the twisting pillar on the Eastern flank of Mauna Loa took the momentary seeming of a colossal figure in the throes of a serpentine. "Isn't it worth being

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sea-sick all the way around the world to see? There's Madame Pelee dancing a hula! It's Kilauea's "Aloha to the Lurline!" And "Kilauea's Aloha to the Lurline" it has always been to us since.

Light and baffling Southerly breezes made progress slow for the first two days after clearing the calm patch in the lee of Hawaii, and when on the 29th these suddenly straightened out into a blustering Easterly blow the immediate necessity of proceeding under shortened canvas offset the advantage of the long-desired wind. For two days the yacht was close-hauled on a course that approximated Southeast, bobbing up and down to the sea and making only moderately good weather under double-reefed mainsail and foresail.

Sea and wind were still heavy at noon of the 31st, but the latter had come up to Northeast, allowing us to sail a point or two free on a course of S. E. by E. Under all plain lower sail we pounded into the hard-heaving seas all afternoon and through the night of the 31st, the decks constantly smothered in volleys of spray and more than a little green water finding its way aboard in some of the heavier plunges, yet averaging close to eight miles an hour all the time. Day broke on a sea of wind-tossed pampas plumes, the onslaughts of which were responsible for a substantial shortening of sail when the morning watch was called. At ten o'clock, with the glass at 29.70 and the wind increased to half a gale, the canvas was still further reduced, leaving the yacht doing a comfortable six knots under double-reefed mainsail and foresail, and with bonnet out of the forestaysail and jib taken in.

For two days, with the glass hovering about 29.65 and the wind blowing fiercely but steadily from E. N. E., we jolted along, full-and-by, at from five to seven knots an hour, logging 129 miles on the 2nd of April and 159 on the 3rd. By this time the torn, fussy seas of the first day of the blow had lengthened out to viciously-running combers, with a resistless power under their swinging up-heaves and a decided sting in the blows of their hissing crests. The big third reef went into the mainsail at dawn of the 4th, after a top-heavy cliff of water bumped its head on the starboard boat in an apparent endeavor to salute the rising sun, leaving that indispensable adjunct to our life-saving service wallowing in its slackened lashing with a started plank. This, with a stove-in galley skylight, made up about the sum total of the damage done by what would have been a really troublesome storm if there had been any land about to look out for. In the open waters of the Pacific the hardest kind of a straight blow is of little moment to a staunch yacht, even though it may have been built as much for racing as cruising. Where the real danger lurks for any kind of a craft is in the twisting hurricanes and the sudden and terrific squalls which attack unexpectedly among the islands. At sea, as on land, most of the menace is in the unforeseen, numerous instances of which truth we had ample opportunity to observe before the voyage was over.

A Marquesan Fisherman who Supplied Lurline During Her Stay

The wind began abating in strength shortly after daybreak of the 4th, and during the day the yacht was gradually restored to all plain sail. We must have passed under the sun at about 6° N. late in the forenoon of this day, for it inclined to the North when the noon sight showed our latitude to be 5° 57′. The air and water which had been showing a diurnal increase of temperature of about half a degree, Fahrenheit, registered 81° and 79°, respectively. There was no suggestion of oppressiveness in the air, and even to cool the cabin the use of a windsail was not necessary.

In the early morning of the 5th the wind began to fall light and fluky, finally resolving itself into a tumultuous series of squalls, the last of which, though it carried the yacht off to the West of South at a terrific pace, fortunately abated before anything carried away. When it had passed the wind settled itself contentedly into E. S. E., from which point it continued to purr amiably —except on three notable occasions—through most of the four months which we spent South of the Line. We had literally run from the Northeast to the Southeast Trades in a single squall.

As we neared the line the only indication of equatorial weather was the ever livelier butterfly chases of the sunshine and showers. The winds, except for increasingly fierce squall which we began experiencing regularly in the early watches, were fresh and steady from E. S. E., and so far as any signs of being in the hated "horse latitudes" were concerned we might have been sailing through a week-long September afternoon off the Golden gate. The sea was very light indeed, considering the freshness of the wind, and we were able to carry most of our kites to good advantage as long as there was sufficient daylight to permit watching the approach of the ever imminent squalls.

On the 7th, at three o'clock, in Longitude 139° 50′, we crossed the equator, just two weeks to an hour after weighing anchor in Honolulu. Air and water were slightly cooler than for some days, each registering 79°, Fahrenheit, and so fresh was the steady breeze from the E. S. E. that we stood uncovered in the sun at noonday and in the shade of the sails felt no discomfort in a rug.

By this time we had made Easting sufficient to place us well to the windward of our destination in any probably shift of wind. Sheets were slackened off, therefore, and freed from the griping luff under which she had chafed almost incessantly for the last fortnight, Lurline slipped away on a course of due South at a gait which ran up close to 190 miles on the log for the day ending at noon of the 9th. At this time, with 240 miles —part of it down a narrow island channel beset with swift currents and variable winds—remaining before we would begin to open up the bay of Taoi-haie, Nukahiva, all practicable canvas was crowded on in an endeavor to

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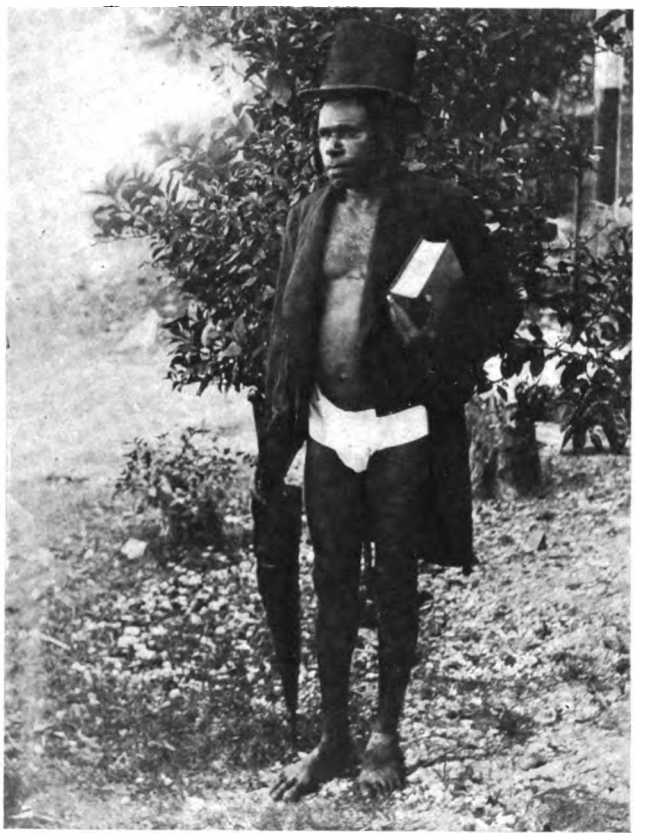
make port the following day. Eight and nine knots we made all afternoon; good speed considering the force of the wind, yet hardly what might have been desired under the circumstances. But the breeze was stiffening as twilight came on, and realizing that failure to make anchorage before another evening would mean a night of standing off and on in a scant seaway and uncertain winds, the Commodore, for the first time since entering those capricious latitudes, allowed the light sails to be carried into the darkness.

Sailing like a witch in the freshening breeze, Lurline reeled off a shade under twenty miles in the second dog watch, and 10.6, 10.8, 11.3 and 11.6 were successively run up on the log as the hours of the first watch slipped away. The night was balmy soft, the breeze a stream of warm milk, and in the air was discernible that faint, indefinable odor of something which heralds the presence



A Paumota Missionary Who Endeavored to Hold a Revival on Lurline

of land to nostrils grown sensitive from inhaling for weeks the untainted atmosphere of the open sea. The heavens, save for a few hurriedly marching squads of the ever-shifting cumulus, were clear and unobscured, and the easy-running swells were as gentle as the night itself.

The yacht continued to reel off the miles like a liner during the early hours of the middle watch, but toward morning the appearance of several menacing turrets of cloud up to windward was the signal for a hurried taking in of the light sails and an easing off of the sheets. For a while it appeared that all of the three rapidly advancing squalls were going to pass astern of us, and so, in fact, two of them did; the third one took an unexpected Southerly spin at the last moment and came charging after us like a mad bull. There was just time to hastily furl the jib, and station men at the fore and mainsail halyards before it broke, and the timely letting go of the latter as the yacht hove down before the terrific force of the wind undoubtedly saved some canvas if nothing more.

The mainsail was checked halfway in its run and the very considerable portion of it that fell overside went hopping and skipping along over the water like a great wounded bird as we smoked away before the squall. For ten minutes, perhaps, we ran thus, half smothered in air and water; then the rain began falling, the wind fell lighter, and shortly the squall had spent itself. Five minutes later the main boom had been hauled inboard, the sail hoisted, and Lurline was gliding off down to South'ard no whit the worse for her rough raking. The main topmast staysail was put on when the morning watch was called, and dawn found her doing a comfortable nine knots an hour with the situation well in hand.

As the sun rose the somewhat vague land smell which we had noted during the night increased to a delicate but unmistakable odor of flowers, a perfume which we later learned is due to the presence in the air of the blown pollen of the *cassi*, a low bushlike plant which carpets all the islands of the Marquesas and blooms perennially. So pungent and far-reaching is this odor that it has become a common saying among trading captains that you can smell the Marquesas farther than you can see them, a statement which is literally true anywhere to the leeward of the group.

Shortly after eight the shattered peaks of the island of Uahuka were sighted dead ahead, and at nine the course was changed to S. W. ½ W. After an hour or so the dim outline of Nukahiva began taking shape in the dissolving mist, and when the scarped and buttressed summit of Cape Martens came edging out from behind the abrupt heads to North'ard, we had something definite to go by, and promptly trimmed in sheets and headed up to clear a forbidding point of black bassalt which our Directions told us jutted out into the sea to cut off the surges from the inner loop of Taio-haie bay.

Along the rugged coast we slipped, now close into a sinister, dirk-like point which reached out to divide and scatter the onrushing seas, and again standing across the opening of a bay or inlet which receded to a snowy beach backed by a lucent lagoon that ended in a dark chasm packed full of unfathomable verdure. Beyond the furrowed brow of Cape Martens a narrow bay, well protected and smooth as a mirror, ran inland beyond eye-scope, piercing the island like sliver of silver. From where it disappeared in dense mass of palm and pandanus a high-walled valley wound back among the serried ribs of the mountains, to apparently end abruptly against a lofty cliff, the sheer side of the backbone range of the island.

Here and there up the valley patches of dancing light shining through the somber green told of a swiftly-running stream, and down the face of the great cliff, literally leaping from the clouds to the earth in a single bound, was a waterfall. Bottle-green it must have been where it began its dizzy plunge away up in the heart of the murky mass of nimbus which veiled its source, but white, snow-white, it gleamed where it appeared under the dark cloud line and fell in a brocade of shimmering satin into the misty depths below. We did not learn about it until the next day; but this fall was Typee Fall, the stream was Typee River, and the valley was Typee Valley, the scene of that most idyllic of all South Sea idylls, Herman Melville's "Typee."

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The Inevitable End, Sooner or Later, of all South-Sea Trading Schooners

We never attained to nearer than five miles to the great fall during our stay in the Marquesas, and accurate figures regarding its height were not obtainable. Findlay's Directory gives it at 2,165 feet, which is probably an exaggeration; but the fact remains that it is one of the highest falls in the world, and without a rival on any island whatsoever.

At four in the afternoon we doubled the gaunt black point toward which we had been steering for some time, to suddenly find the panorama of the beautiful bay of Taio-haie unfolding before us. Pursuant to instructions in the Directory we ran up the "Jack" to the fore and stood off across the entrance waiting for the pilot, without whom, so we read, there was a heavy penalty for entering. Then we went about and ran back past the little island at the end of the point, all without awakening a sign of life along the drowsy shore where nestled the village. After repeating this maneuver twice more the Commodore finally ordered the sheets slacked off and gave the man at the wheel his bearing for the first leg of the run in.

"Perhaps the pilot has overslept on his siesta to-day," he remarked dryly; "and if that's the case our anchor gun may wake him up."

We went in neatly and expeditiously. "Keep the Eastern outer bluff on the starboard," read the Directions, "rounding the island off it within a cable's length. All the Eastern shores of the bay are steep too and free from danger, and the wind will always lead off." And that was about all there was to it. We let go the anchor a few minutes after five, a quarter mile off the rickety wharf, in seven fathoms, our time from Honolulu being seventeen days.

The firing of our little signal cannon might have been the setting off of a mine under the whole village, so electric was its effect. Dark figures sprang up from nowhere and darted hither and thither and yon, and following the appearance of a corpulent figure in pajamas at the door of what seemed to be the official residence, the tri-color of France went jerking up to its flagpole. Down the front street shortly came a ponderous figure in brass helmet and white uniform, followed by a trailing sword and a half-dozen natives carrying oars on their shoulders. Two others, also white-clad and sun-helmeted, joined the procession as it passed by what appeared to be a trading store, and the three proceeded together to the wharf and put off in a whaleboat.

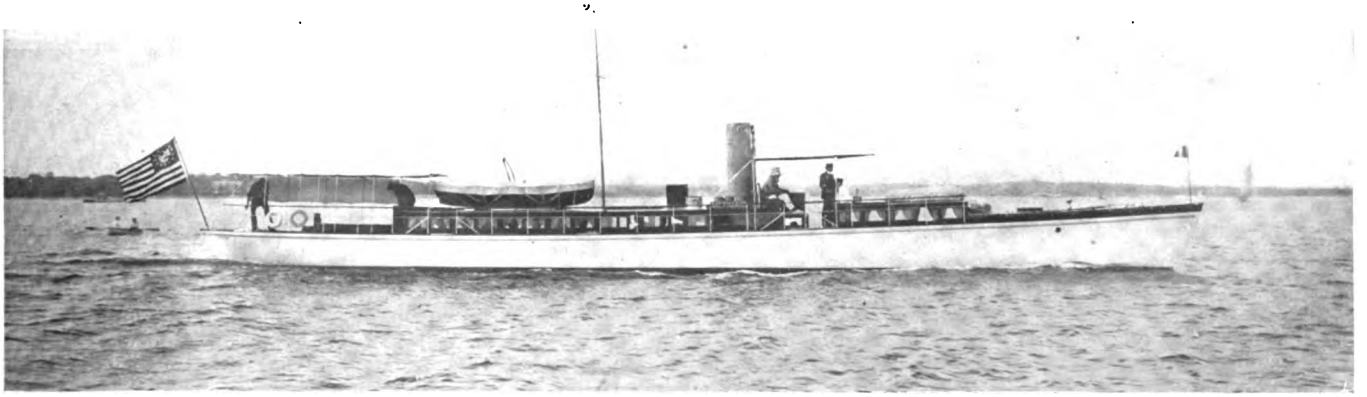
Driven by the erratic but powerful strokes of the big natives, the boat was quickly alongside, and the official-looking gentleman came puffing up the ladder hastily lowered to assist him. He was Brigadier Bouillard, he announced between gasps in broken English, and the other gentlemen following him over the rail were, respectively, Mr. Cramer, a German trader, and Mr. McGrath, an American trader—also, as we learned later, an ex-Mormon missionary.

"By the way, where's your pilot, Monsieur le Capitaine," asked the Commodore, after the large official had examined our papers and admitted the yacht to practique. "Hasn't he overslept this afternoon"?

"Zee pilate! he ees no"— And at this point, with wild rollings of the eyes and fierce tuggings of the moustaches, the Brigadier relapsed into French so voluble and excited as to prove quite unintelligible to our untrained ears.

"The Brigadier," explained the blonde Cramer in his exact Teutonic English, as the excited Frenchman paused for breath, "is trying to say, in effect, that the last pilot but one was killed and eaten by relatives of a trader's crew that was drowned when the schooner was piled up on the beach through the pilot's carelessness, and that a similar fate overtook his successor, apparently for no other reason than that the office had become an unpopular one with the natives. Since then," he added, "the government has been unable to find anyone willing to accept the position under any inducements."

So our anchor gun did not wake up the sleeping pilot of Taoi-haie after all. *(To be Continued.)*



S. Y. Mermaid, Owned by J. Pierpont Morgan, Jr., N. Y. Y. C.

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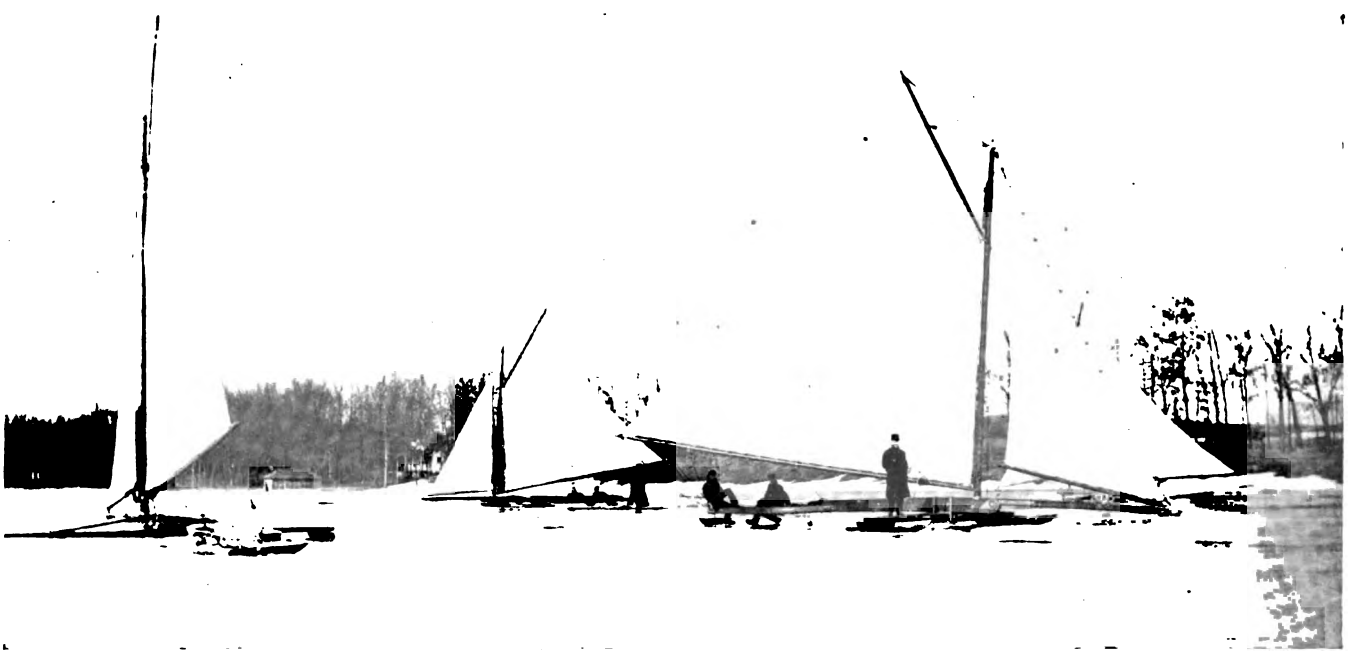
ICE YACHTING

H. Percy Ashley

SURELY the Pilgrim fathers who pushed their dugouts over the frozen surface of the lakes and rivers with the aid of a squaresail and a favoring wind would drop dead with surprise to see the modern up-to-date racing ice-yacht speeding at the rate of 140 miles an hour, but such is the record made by my old friend Capt. Lashe Price, of Long Branch, N. J., who made this speed in the lateen ice-yacht Clarel. "Never again," he remarked, "I promise you that I will not travel at that rate of speed, if I know it, I felt the sensation of being hurled through the air at this terrific speed for four days afterward, and it was just as near riding on a bolt of lightning as I ever expect to get. I had Charley Blair with me, and I never knew how I kept Clarel headed straight for the mark. The stop notches gave me the mile in 25 seconds flat." Clarel is a small craft, with a sail area of 200 squre feet, owned by Walter Content, of the Shrewsbury Ice Yacht Club at Pleasure Bay, Long Branch, N. J.; but I am willing to wager a fur coat that if Capt. Lashe was hard-pressed to win a race to-day he would keep the boat going no matter what the speed was, as he is a veteran of much experience and talent in the racing ice-yacht game.

There are not any very startling changes in construction within the past two years. The latest is placing the cockpit one-third forward of the runner post in the space of the backbone between the steering post and the runner plank, and running a sprocket chain between runner post and steering tiller in cockpit, which is fully explained later on.

As a result of a sporting agreement made last winter between James O'Brien, of Orange Lake and Shrewsbury Clubs, owner of Jack Frost, 350 sq. feet, and Henry H. Monroe of Long Branch, owner of Princeton, 350 sq. feet, these gentlemen have deposited $1,200, to be sailed for on a series of match races between the two ice-yachts of 350 square feet; each series to be three heats; course 15 miles and time limit 40 minutes; the first three races to be sailed at Shallow Point Course, Pleasure Bay, N. J., and the second and third series to take place at Orange Lake, near Newburgh, N. Y. Owners deposit $100 on each race, or $1,200 on the series. The winning boat of each race receives $200 and the boat winning the greatest total number of races receives $250 additional from the loser. Capt. Asher Wardwell will handle Princeton and Charley Blair will be at the tiller of Jack Frost. Weights on the runner planks will be allowed.



Some of the Kalamazoo Ice-Yacht Club Fleet Pedro Storm King, Dreadnaught and Zero

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I can safely say that I consider Wolverine, with 776 square feet of canvas, of the Kalamazoo Ice-Yacht Club of Michigan, under the masterly handling of Commodore D. C. Olin, the fastest first-class boat in the world. The only competitor in the first class she has to-day is Commodore Archibald Rogers' Jack Frost, carrying 754 square feet of canvas, of the Kalamazoo Ice-Yacht Club pennant, which stands to ice-yachtsmen in the relative position as America's Cup does to their brother sportsmen of the sea. The Kalamazoo Ice-Yacht Club members look with longing eyes at this trophy of the world's supremacy of the frozen surface, and I would not be surprised if they made a try to bring it to the middle West with the big Wolverine. The race must be sailed on the Hudson River course above the Poughkeepsie Bridge, and the time limit is 1 hour and 20 minutes, without time allowance. It certainly would be a grand race.

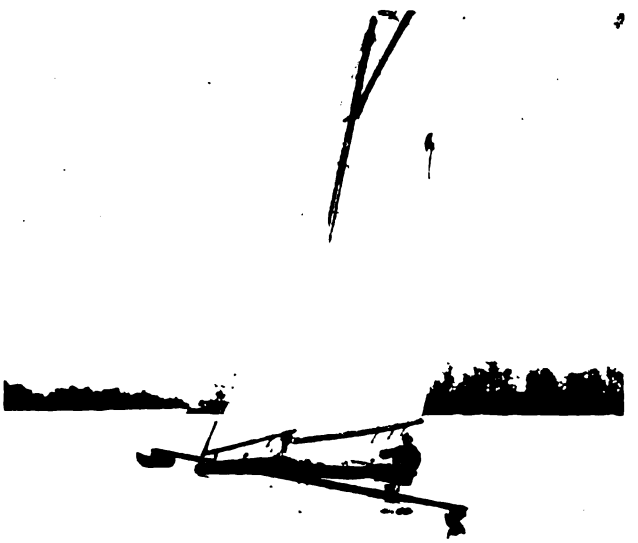
Another cup that should be raced for is the Van Nostrum Challenge Cup, put up years ago by the Orange Lake Ice-Yacht Club, and won by the North Shrewsbury Club, owing to a break-down of the Orange Lake boat, Dragon. It is up to the Orange Lake Yacht Club to send a couple of speedy boats to Red Bank and make a try for it.

The sportsmen in the middle West do not seem to have the heart any more to come to Gull Lake at Kalamazoo, Michigan, to race, as for several years, from all quarters, they have been badly beaten by Wolverine and Joker of the Kalamazoo Ice-Yacht Club.

Most of the leading clubs are using weights strapped on the runner plank over the fore runners, which is as fair for one boat as another. Twenty-five years ago, when the mast was stepped over the runner plank and the boats were equipped with side bars in place of the wire rope runner plank stays of to-day, a man was stationed on the windward side of the runner plank and held fast to the shrouds for dear life, traveling across the board that held the side bars and backbone in place as the boat came about. It was ticklish work for the man, I can certify, as I have been there many a time. In those days an ice-yacht was not under the control it is to-day. If they decided to bolt or skid around, they did it, and there was no stopping them. Scientific designing has removed this obstacle, as those craft, even the cream of the fleet, were rule-of-the-thumb boats. I had occasion to handle a boat of this type recently. I was called upon to see what was the matter with her. She must have been at least forty years old, of the side-bar type, beautifully made and finished in black walnut with a main boom out over her stern about 12 feet. There was a stiff, puffy wind blowing when I tried her, and as it struck her she would swing completely around, sometimes twice, and start off as if she had the blind staggers. It was dangerous for the other boats sailing in the vicinity, and they promptly took to cover. I cut her down to half her original size, and made her into a 250-square-footer, with wire side stays, short, cut-down runner plank and new sails. In this rig she won races in her class. The backbone, when cut over, was one of the finest sticks I ever saw, clear white pine, with hardly a knot of the smallest size, 30 feet long, without a check, and seasoned for forty years. The plank was butternut, perfect, its equal I never saw duplicated, except perhaps in the big Icicle, which craft won the world's pennant many years ago. Perhaps some of the old guards in the ice-yacht ranks will remember, in 1876. Mr. Irving Grenneil, then commodore of the New Hamburg Ice-Yacht Club of the Hudson River, exhibited in Machinery Hall at the Philadelphia Centennial, an ice-yacht, at that time the perfection of the type. She was designed and built by the late Jacob Buckhout of Poughkeepsie, N. Y., the dean of ice-yacht builders. Well do I remember her with her silver-plated iron work, inlaid steering box of ash and black walnut, a two-piece backbone with a beautifully carved griffin placed under her bowsprit, the mast set plumb over the runner plank, and with a big jib and a low-cut, squatty mainsail with comparatively little peak to her mainsail, short gaff with boom extending far over the stern. She had side bars, and at the stern built between them was a cockpit with room nough for a card party. Her name was Wizz, and at her truck hung the champion silk pennant of the world. She was the finest ice-yacht I had ever seen as a youngster, and I have never met her equal yet for elaborate finish.

In an up-to-date ice-yacht for racing the essentials

Dreadnaught, of Kalamazoo Ice-Yacht Club, Formerly in the Red Bank Fleet



The Tomahawk, Stockholm Ice-Yacht Club, Sweden

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are lightness, combined with strength, a certain amount of give or limberness, perfect handling under sail, the center of sail balance to exactly balance center of hull resistance and the proper spring to the runner plank. The runners alone are a work of art. Many make them, but few know how to bring them to perfection, or as near to it as has yet been obtained. It is an art, and requires experience and long practice. I would just as soon think of equipping an ice-yacht without sails as without a perfect set of runners, and much of the speed depends on them. All angles have been tried for the runner shoes, but 45 degrees for the midship section and a downward curve of ⅛ inch fore and aft for a 5-ft. 3-inch runner (including wood) has produced the greatest speed. The late Com. H. C. Higginson, with whom I was connected, spent years and a large amount experimenting with runner shoes with the above results.

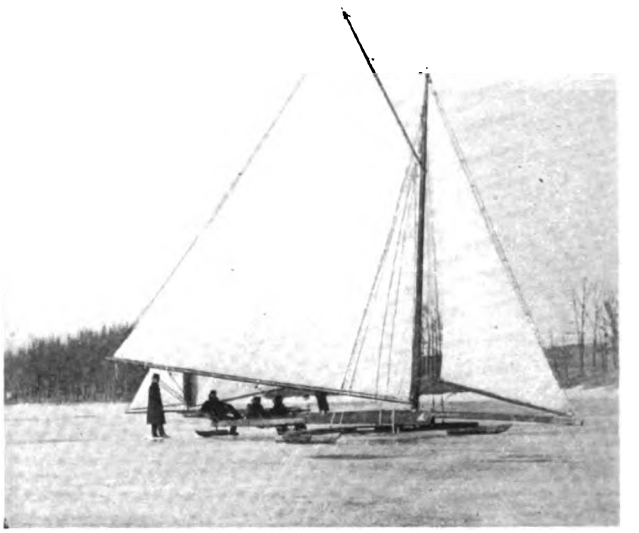
The cat rig has great speed for an ice-yacht, but cannot be depended on, as no matter how far you step the mast forward of the runner plank they will throw themselves in the wind's eye in a hard puff, and are dangerous neighbors in a race, especially as a bunch of boats are rounding a turning flag. The lateen rig is a thing of the past, as there is too much leeward curve to the long leach, which prevents them from making good windward work.

The largest and most influential club on the Hudson River is the Hyde Park Ice-Yacht Club, situated at Hyde Park, a few miles above Poughkeepsie, with a membership of ninety and a fleet of thirty-eight ice-yachts, as follows:

The officers of the Hyde Park Ice-Yacht Club are: Edward H. Wales, Commodore; Theodore H. Briggs, Vice-Commodore; Harry T. Briggs, Secretary; George E. Bilyou, Treasurer; Dr. Fred. B. Weaver, Measurer; Regatta Committee, George R. Stroutenburg, Chairman; Frank Cleary and George L. Williams. There are a goodly number of prizes put up this winter for racing in 4th, 5th, and 6th class, and free-for-all class.

Ice-boating at Orange Lake has not the vim since the death of Com. Henry C. Higginson, and except for the unfinished race for the championship pennant of Orange Lake, the Shrewsbury Ice-Yacht Club and the Orange Lake Ice-Yacht Club having won one heat. It is with sorrow that we realize that the days of Snowdrift, Dragon, Windward, Coldwave, Arctic, and a dozen other fine ones, are over.

The only radical change in design in the last few years is that of the "heavy-weather" model, so called because the center of gravities are brought closer together, it making the boat have greater stability, resulting in a less weight of boat for a certain amount of sail boat will carry, a high sail, and the tendency to "flicker" or spin around is reduced. Dr. Steinburgh, the designer of the "heavy-weather," has several ideas that may result in the greater enjoyment of the sport. At the coming annual meeting of the Orange Lake Ice-Yacht Club the matter of getting up a boat to bring back the Van Nostrum Cup, now in the possession of the Red Bank Ice-Yacht Club, will be discussed. It is a fine challenge trophy, and has been held by the Red Bank Club for a number of years, and deserves to be raced for. It was won by Scud, of the Red Bank Club, Dragon, the Orange Lake boat, parting the outhaul on boom, when over half a mile ahead. The latest addition to the fleet at Orange Lake is a 250 square-footer, designed and built by Dr. Steinburgh, of entirely new ideas on a scientific basis. I looked her over well while building, and was more than favorably impressed. She has a two-piece solid backbone of bass wood measuring 24 feet over all. The cockpit is egg-shaped, and of the bowel style, and is placed two-thirds between aft of the runner blank. This places the cockpit one-third forward of the runner post, and the cockpit acts as a leverage on the runner plank, thus to a certain extent acting as a weighted plank and keeping the boat from rearing under a puff. The rudder post being so far aft of the cockpit a sprocket wheel is placed on the rudder post just above the crutch that holds the rudder runner. The tiller post is at the aft end of the cockpit, and pierces the backbone. At this point on the under side is another sprocket wheel the same dimensions as at the rudder post. The two are connected with a sprocket chain, the slack of which is taken up with a nickel, steel, or bronze turnbuckle, with a shackle on each end, attached to the links at opposite ends of the chain. The mainsail is narrow, and with the center of effort placed higher than usual, and is balanced by a sprit-fire jib, whose center of effort is low, making the combined effort rather high. It is claimed that this high effort is counteracted by the cockpit being placed nearer the runner plank. This may be so, but with a set of sails whose effort is high a good heavy plate of lead securely strapped over each forerunner, and an extra man in the cockpit, has made some mighty fast time. I am looking forward with interest to the performance of the Doctor's new boat in a stiff and puffy breeze, and am sure she will give more than a good account of herself. She has an unusually narrow spread of cut between the fore runners, which will help greatly at the turns, as in the Orange Lake course there are four turns to a lap, sailed five times, making a total of twenty turning flags in the diamond course.



Cracker Jack. Kalamazoo Ice-Yacht Club

At the North Shrewsbury Club, at Red Bank, N. J., the first race of the season was sailed on January 10th, 1910. Breeze strong from Northwest, boats reefed, and weights on runner planks, triangular course of ten miles, for the Power's Cup. Starters: Edward Asay's Daisy, Wm. White's Silver Heels, and George Gillig's Wizard. Daisy took the lead and won by a head of ¾ of a mile; time 21 min. 28 sec. Wizard and Silver Heels finished close together. January 11th two races were sailed, at noon, for champion pennant of North America, it being the unfinished contest of two years ago,

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in which Imp and Tyro of North Shrewsbury Ice-Yacht Club sailed against Drub and Isabella of the Shrewsbury Club. The race called for a triangular course of 20 miles, time limit 1 hour, 15 minutes. Charley Burt sailed Imp and Garret Morford sailed Tyro. Frank Van Bront was the Skipper of Drub, and Capt. Lashe Price was at the tiller of Isabella. From the start Imp led with Isabella in second place; Tyro and Drub exchanged position several times. Imp finished first; time 1 hour, 3 minutes. Isabella's time, 1 hour, 7 minutes, 20 seconds; Drub, 1 hour, 7 minutes, 20 seconds; Tyro, 1 hour, 10 minutes, 10 seconds.

The officers of the North Shrewsbury Ice-Yacht Club are as follows: Commodore, Thos. H. Grant; Vice-Commodore, James B. Weaver; Secretary, I. Hance; Treasurer, Henry N. Supp. Regatta Committee, Capt. C. E. Throckmorton, Chas. Minton, Henry N. Supp, E. E. Morris, Augustus Haverland; and Measurer, Geo. B. McClellan Taylor.

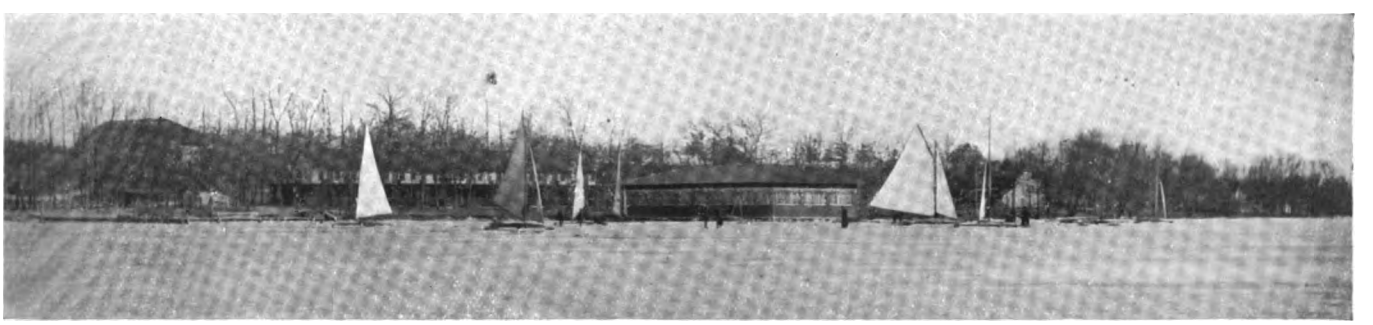
The South Shrewsbury Ice-Yacht Club, whose palatial clubhouse is situated at Shallow Point on Pleasure Bay, N. J., has one of the best racing fleets in the East, mostly of the 350-square-foot class. Unfortunately the ice last winter was rather soft and rough, thus accounting for the slow time made. The prospects for the coming season are very bright, and a good list of valuable trophies and cups will be raced for. Henry H. Munroe's two new boats are completed, being designed and built by Capt. Asher Wardell, the creator of the speedy Princeton. Com. Gibbens has a new boat built by Capt. Riddle. Leroy has been rebuilt and tuned up to concert pitch. An ice-yacht is being shipped to Canada by this club for the winter's racing. In the series of races between the North Shrewsbury Ice-Yacht Club of Red Bank, N. J., and the South Shrewsbury Ice-Yacht Club, the Red Bank boats will be shipped to the South Shrewsbury Club, and the races held there.

The Shrewsbury Ice-Yacht Club, situated on Pleasure Bay just back of Long Branch, contains a large membership and a large fleet of smart boats. The following prizes were put up last year: The-Board-of-Trade Cup, The Commodore's Original Cup, The Commodore's Cup, The M. G. Kohn Cup for boats winning most second places, The Walter Patten Inter-State Cup, The Price Brother's Cup, The Porter Cup, The James O'Brien Cup, and The Robert Wilson Cup.

At Cleveland, Ohio, they have an ice-yacht club with 35 members, who are enthusiastic over the sport. The officers are: Commodore, Wm. P. Newell; Vice-Commodore, Otto Muelhausen; Secretary-and-Treasurer, Otto Nehrenst; Measurer, Fred. W. Radcliffe; Ass't Measurer, J. A. Newell; Regatta Committee, Wm. P. Newell, Chairman; Chas. Martelock, Fred W. Radcliffe, Capt. Chas. E. Motley, J. A. Whitelaw. The ice-yachts are divided as follows: Class A, 250 feet sail area and over; Class B, 249 square feet and under. The ice racing is done on the protected harbor of Cleveland, of five miles long by ½ mile wide, situated in front of the city of Cleveland. The ice is keyed in, and there is usually three months sailing. They have heavy falls of snow, but the strong lake breezes blow it entirely off the ice, so that good sailing is the rule rather than the exception during the season.

The Kalamazoo Ice-Yacht Club of Michigan seems to have captured all the prizes worth sailing for in the West, with Wolverine and Joker in first class, and Hilo and Pedro in second class. These four have cleaned up all the boats in the vicinity. Wolverine, sailed by Com. D. C. Olin, holds the world's record for a 20-mile course windward and return in 40 minutes flat. This is an official record, and not a wild newspaper yarn. As the four named boats had the balance of the fleet beaten, and as no outsiders cared to compete, Commodore Olin and the race committee got up the following scheme of using club boats, not racers, for the Wells Cup, which was conducted as follows: Notices were sent to every member in the afternoon of the day before the race and as many boats would be used as racing skippers applied. The course was to windward and leeward, a distance of ten miles, no time to be taken and no time allowance given. The first boat returning over the starting line after sailing full course won. Then every crew changed boats, the crew winning the heat to take the last boat to finish, etc. They sailed another race, then again, until every crew had sailed every boat. There was eight days of racing. The first day only six boats showed up at the starting line, gradually increasing to seventeen ice-yachts on the last day. Com. Olin sailed in only part of the races, but he won points enough to win the prize of the Wells Cup of winter of 1909 and 1910. In one day he scored in nine races with nine different ice-yachts, making seven firsts, one second, and one fifth place, thus convincing his fellow club members that he was the Grand Old Man of the Middle West on the handling of an ice-yacht.

Wolverine, of the Kalamazoo Club, now holds the F. A. Stewart International Championship Trophy, the Michigan State Flag, and the Wm. R. Hearst International Championship Cup. The trophies are sailed for under the same rules that govern the races for the World's Champion Pennant at the Hudson River.



Locker Rooms and Clubhouse of the Kalamazoo Ice-Yacht Club

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MECHANICAL HORSE-SENSE

Herbert L. Towle

THREE-QUARTERS of the troubles commonly experienced with the power plants of small boats, it is safe to say, could be avoided by the application simply of plain common-sense plus the most elementary knowledge of mechanics and electricity. The trouble is that every man has an aptitude in some particular direction or directions, and a mechanical bent may not be included in the list. A man's natural inclination may be toward law or medicine, or trade, and he may shun even simple jobs of mechanical tinkering from the same sort of aversion that makes him reluctant to attempt the smallest tasks in cookery or needle work. Such men will get little profit from any amount of printed mechanical instructions. On the other hand, it is probable that most power-boat owners are willing to learn, but are simply thoughtless. The man who puts in extra cells of battery to overcome the resistance of unduly small wire or of badly spliced joints, instead of soldering the joints or using larger wire, is not necessarily a fool. He simply does not realize that he is wasting electrical energy. The man who neglects to line up the engine and propeller shaft, and spends good gasolene and oil to destroy the shaft bearings in consequence, would deserve the epithet of "lobster," if he realized what he is doing, which, of course, he does not. The thrifty amateur who takes up the crank-shaft bearings of his own engine, but neglects to make sure that the journals are round and that the bushings bear evenly, needs simply a hint as to the inability of steel and babbitt to conform themselves like softer materials to irregularities of surfaces, and he will realize that, instead of the whole of the bearing surface doing its work, he is probably making use of much less than half. We laugh at the man who puts a big wrench on a small nut and is surprised when the bolt lets go, but we do not always offer a helping suggestion for his real trouble, which is probably that the nut persists in jarring loose under vibration.

Let us review briefly certain elementary facts regarding materials, lubrication and electricity, and see what light they throw on the every-day problems of the power-boat owner. To begin with, let us take the matter of bearings; meaning by this, any case where one surface rubs against another with appreciable pressure.

The first fact is that, with the few possible exceptions, two surfaces rubbed together dry will abrade each other, no matter how smooth they are. If both are of the same material, they will scratch more easily than if they were of two different materials. If one is a soft metal and the other very hard, the hard metal may be polished, not scratched. When the pressures are high the abrasion amounts to deep scoring and tearing of at least one of the surfaces, owing to the tendency of the materials to cling together and to heat up from friction. To prevent this scoring, a film of oil or grease is interposed, being retained partly by capillary attraction and partly by the feeding of fresh lubricant as fast as the old lubricant works out. The pressure per square inch must not exceed a certain limit, depending on the size and materials of the surfaces and their relative motion, else the lubricant is squeezed out faster than it goes in.

The second fundamental fact regarding bearings is that the deviation of the surfaces from a perfect fit must not exceed the minute ability of the metals to adapt themselves to irregularities. The journal and its bushing must therefore be round; not nearly round, but exactly round, within a limit of error of one or two thousandths of an inch where oil is used, and twice that where grease is the lubricant. If the bushing is stationary, only the portion against which the shaft bears requires to be true in curvature. If either the shaft or bushing is irregular, it follows that only the high spots will do the work, and the pressure on these high spots is naturally great if their aggregate area is small. It is customary to fit bushings by scraping and to test them with a thin smear of red lead, which shows what portions touch the shaft. Even the best scraping leaves the bushings less than perfect, and a new engine or one just overhauled needs a liberal oil supply until the shaft and bushings have "run in" to a perfect contact. In time the main journals, and particularly the crank-pins, wear out of round, owing to the pressure being greatest in certain positions. The bushing also wears out of round, and when the attempt is made to correct the wear by simply taking out shims.

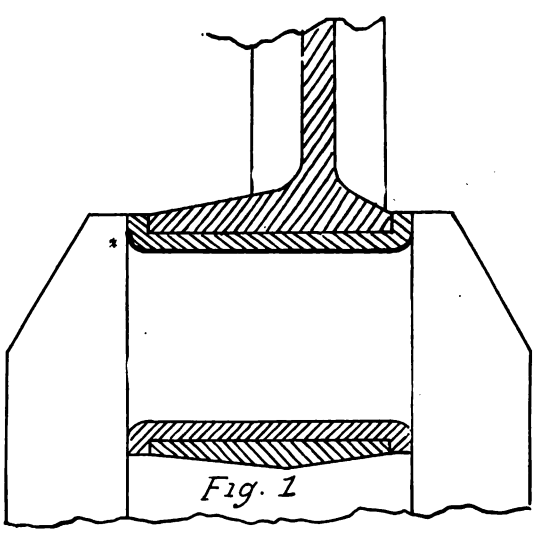

Fig. 1

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the probability is that contact is made only over a limited number of high spots. Fig. 1 shows a typical case. This accounts for the rapid loosening up of the bearings after the usual amateur's job of taking-up. A journal out of round cannot fit anything, and it must be corrected by grinding, or by very skillful filing—a job beyond the scope of the amateur.

Another point regarding bearings, which, however, concerns the crank-shaft more particularly, is that few multi-cylinder engines have the main shaft bearings so proportioned that all will wear down at an equal rate. Perhaps the fly-wheel bearing will wear down faster; perhaps that at the other end. Most probably, however, the intermediate bearing will wear fastest. The result is that, if the wear is allowed to continue, every explosion in the cylinder adjacent to the loosest bearing springs the shaft downward to the extent of the play in that bearing. It is a property of all metals that if subjected to constant and severe bending, they will in time break. A crank-shaft, owing to its form, is more flexible than a straight bar of steel of equal diameter and length; nevertheless, crank-shafts do break, and they break soonest when they are most abused. Ordinarily speaking, a crank-shaft bearing should not be allowed to get more than four or five thousandths of an inch loose, or about the thickness of a heavy sheet of note-paper.

The principles just cited are fundamental and apply to all sorts of bearings. Propeller shafts, for example, are more or less flexible, and do not demand such exact alignment as crank-shafts. Nevertheless, when a shaft is forced out of line by a misplaced bearing, it imposes a pressure on that bearing which it was not intended to sustain. More than probably, the pressure is not evenly distributed all over the bearing, but is greater at one end of it. The superiority of babbitt metal over bronze for engine bearings and the like lies in the fact that the babbitt is soft enough to adapt itself to slight faults of alignment and surface. It is a fact, however, that lead, which is the chief component in babbitt metal, possesses of itself a certain greasiness of texture which renders it superior to the harder bronze. If a bronze bearing goes dry of oil it not only is destroyed by cutting, but it cuts the shaft as well. Babbitt, on the other hand, simply melts under the heat of friction without harming the shaft.

Inseparable from the subject of bearings is that of lubrication. The notion that lubrication is a minor detail, and that the oil or grease may safely be trusted to find its way where it is needed without special encouragement, is certainly not as prevalent as it was in the days when even designers left the provision for lubrication until all the rest of the design was finished and then added it as a sort of afterthought in any way that came handy. Careful tests of lubricating oils under laboratory conditions have demonstrated conclusively that drop by drop lubrication is far less effective than flooded lubrication. Knowledge of this fact has lead to the splash system of oiling the crank-case. This system is ideal, as enough oil is provided, by which is meant as much oil as the engine will stand without undue smoking in the exhause. Most engines are provided with tell-tales of one form or another, by which the user can easily ascertain how much oil the crank-case contains. In the absence of such information, the presence or absence of smoking in the exhaust is good evidence. A 2-cycle engine is harder to lubricate than a 4-cycle, as the oil in the crank-case is speedily converted into spray and blown up into the cylinder. The new device of dissolving the oil in the gasolene is reported to give excellent results in 2-cycle engines. The usual proportion is about one pint oil to five gallons gasolene. For the main bearings of these engines grease is commonly used to prevent the compressed charge in the crank-case from blowing by the shaft.

Let us glance at another subject—that of vibration and its effects. Two parts, for example a connecting rod and its cap, which would be held securely together under a steady load, by ordinary bolts and nuts, will contrive to shake those same nuts off the bolts in short order when the engine runs. Even lock nuts do not always overcome the loosening effect of vibration. The experience of builders of automobiles, which are probably more subject to vibration and racking than any other machines in the world, has shown that the best security is a nut and a lock nut, plus a positive hold for the lock nut. This positive hold usually takes the shape of slots in the lock nut, through which end of the bolt a cotton-pin may be passed. In places where the requirements are not so severe, what are known as lock washers or spring washers may be used, but they are only dependable where the vibration is moderate.

In connection with this same subject of rigidly securing two parts subject to vibration or to racking strains, an essential point is that the surfaces themselves shall be clean. Strange to say, the novice often ignores this fact and proceeds to bolt together greasy and dirty surfaces with cheerful assurance. Obviously, unless the parts bolted together are of soft material, so that the particles of dirt can embed themselves, the result is simply that all the pressure, or most of it, comes on a few grains of dirt, which crush more or less until an apparently snug job is produced. Under vibration, however, these dirt particles crush still more, and presently the parts supposed to be securely attached are found to be in fact slightly loose. This applies not only to such parts as connecting rod caps, cylinder heads, crank-cases, bearings, bushings and the like, but also to the bolts and nuts themselves. Every bolt and nut should be cleaned and tightened up against clean contact surfaces; otherwise a few grains of dirt may spoil an otherwise good job. About as absurd a piece of advice as the writer has happened to see in print appeared lately for the benefit of owners confronted with the problem of making a nut hold under vibration in the absence of a locking washer. The advice was to put a pinch of sand under the nut and tighten down on the sand! A practical makeshift, though admittedly undesirable, is to take a prick punch or chisel and burr over the thread just outside the nut. Another and better plan is to make a special washer from a piece of soft steel about 1.32 in. thick and large enough to have some of its edges bent up to hold against the flat sides of the nut, while another portion of its edge is extended to form a lip, which may be turned over an adjacent edge of the part under the nut, and thereby prevented from turning. Still another plan, which, however, requires tools, is to drill a hole through the lip and tap a corresponding "hole" in the

Fig. 2

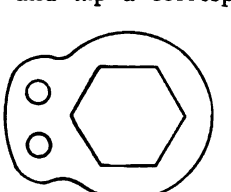

Fig. 3

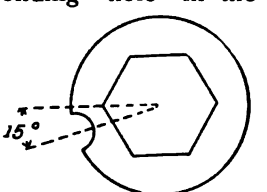

Fig. 4

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stationary part, into which a screw may be inserted to hold the special washer. See Fig. 2. If the washer is too thick to be turned up, it may be cut out in hex form to slip over the nut, and have a couple of holes drilled in the lip to give a choice of positions for locking. See Fig. 3. A still simpler form is shown in Fig. 4, which represents a round washer cut out in "hex" form and having a notch in the edge at a point 15 degrees from the large diameter of the "hex." This notch holds the locking screw. By turning the washer the other side up, the nut can be rotated 15 degrees. The result is to give the nut a series of positions 15 degrees apart through its entire rotation.

When a part is found to have loosened up from vibration, don't attempt to tighten it up, using the same old screws and bolts, unless you are willing to repeat the tightening-up process at frequent intervals during the life of the bolt. Find out why it loosens up and provide holding means which will resist adequately in the direction of the vibratory forces.

A common fault for which the builder is usually to blame, and which the user must contrive some means to correct, is poor fitting. It is easy enough to make parts which will be interchangeable if only the fits are sufficiently loose. For example, brackets and other attachments subject to vibration may be attached by bolts or screws considerably smaller than the holes through which they pass. The hold is then purely frictional, and depends entirely on the tension of the bolts or screws. See "A," Fig. 5. If there is no particular vibration, and if the principal function of the bolts is to hold in tension, the sidewise looseness may result in no harm. If, however, the sidewise vibratory stresses are the chief ones encountered, it is essential that the bolt holes be a true fit for the bolts. If this is not done, sidewise vibration will probably result as shown at "B" in Fig. 5, regardless

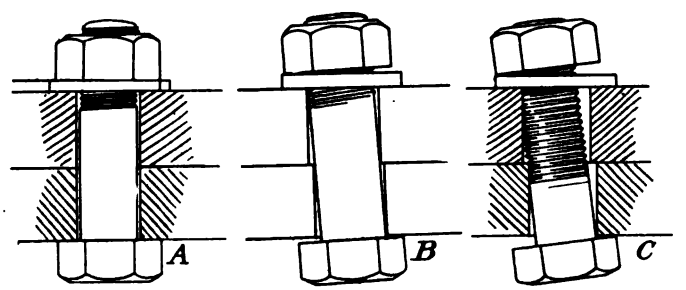

FIG. 5

of how tightly the nuts may be drawn. The condition is aggravated if the bolt threads extend as shown at "C", since the threads will batter and wear down under vibration. The remedy is either to fit dowel-pins (and these must be large enough so that they will not crush or shear), or, better, to ream the bolt holes true and procure larger bolts which shall be a drive fit in the holes.

Another instance of poor workmanship, for which the builder is responsible, is the attempt to make a taper pin do the work of a key. The pin weakens the shaft much more than a key, since it cuts right through the shaft, but its holding power is smaller, since it is limited to the two sections "A" "A" of the pin at the surface of the shaft. See Fig. 6. A key would have a much larger section in shear and therefore a better hold against twisting, while it would not cut into the shaft nearly so much. If taper pins must be used, it is better to have two or even three of them and to make them small and place them far enough apart not to weaken the shaft

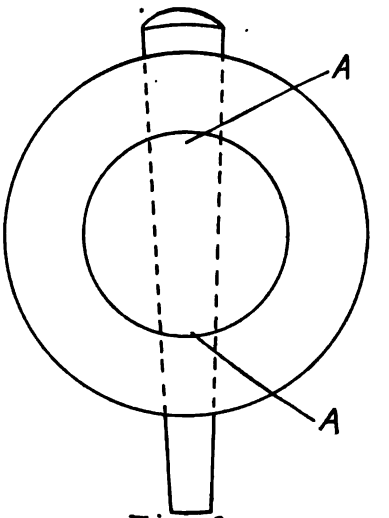

Fig. 6.

unnecessarily. The severe vibration of road service, and the need of making every bit of metal count, have led to the practical abandonment of taper pins in automobile construction, and to the use even of keys only in connection with other holding means, such as a taper fit on the shaft with a nut to draw the parts tightly together. Automobile fly-wheels are almost never keyed on their shafts nowadays, but are bolted to a forged flange to give ample holding power. This feature of construction has found its way into marine practice also, with beneficial results.

The amateur who undertakes to attach a bracket or other fitting to the woodwork of his boat is apt to make a job which only temporarily holds tight. In the course of a season or two it works loose and betrays all too plainly the lack of skill with which it was installed. This result is due usually to one of two things: either the use of too small nails or screws, or, more probably, inadequate bearing surface between the metal fitting and the other surface to which it is secured. Wood is relatively soft, and it endures only a limited pressure per square inch without slowly yielding. To make a handle or bracket permanently tight, it must first be held with sufficient pressure to resist the greatest strain that may be put on it. This implies a sufficiency of nails, screws, or bolts. Since these screws or bolts tend to force the metal into the wood, the pressure they exert must be distributed over a surface sufficient to sustain it. The amateur is only too likely to save pennies by putting in cleats, blocks, door and drawer handles, and other hardware, a size or two too small for their work, or formed up of light stampings where castings should be used. The result, of course, is a dilapidated-looking craft before the end of the first season.

A blunder, sometimes made by the boatbuilder when installing the engine, is that of putting right-angle elbows in the exhaust and intake pipes. The writer has even seen intake pipes fitted with a series of two or three or four such elbows. Of course air, like water, has inertia and it cannot get around a sharp corner quickly. If the owner sees the boatbuilder toying with short elbows in the pipes, it is his business to protest promptly and with emphasis. It is nonsense to pay for a 20-horse-power engine and get 12 or 15 horse-power because of bad fitting. It would have been cheaper and more sensible to buy a 12 or 15-horse-power engine in the first place and fit it up properly .

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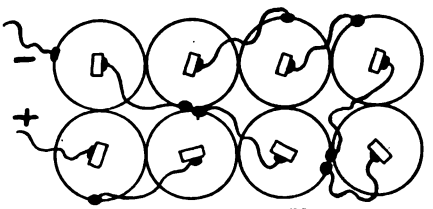


Fig. 7.

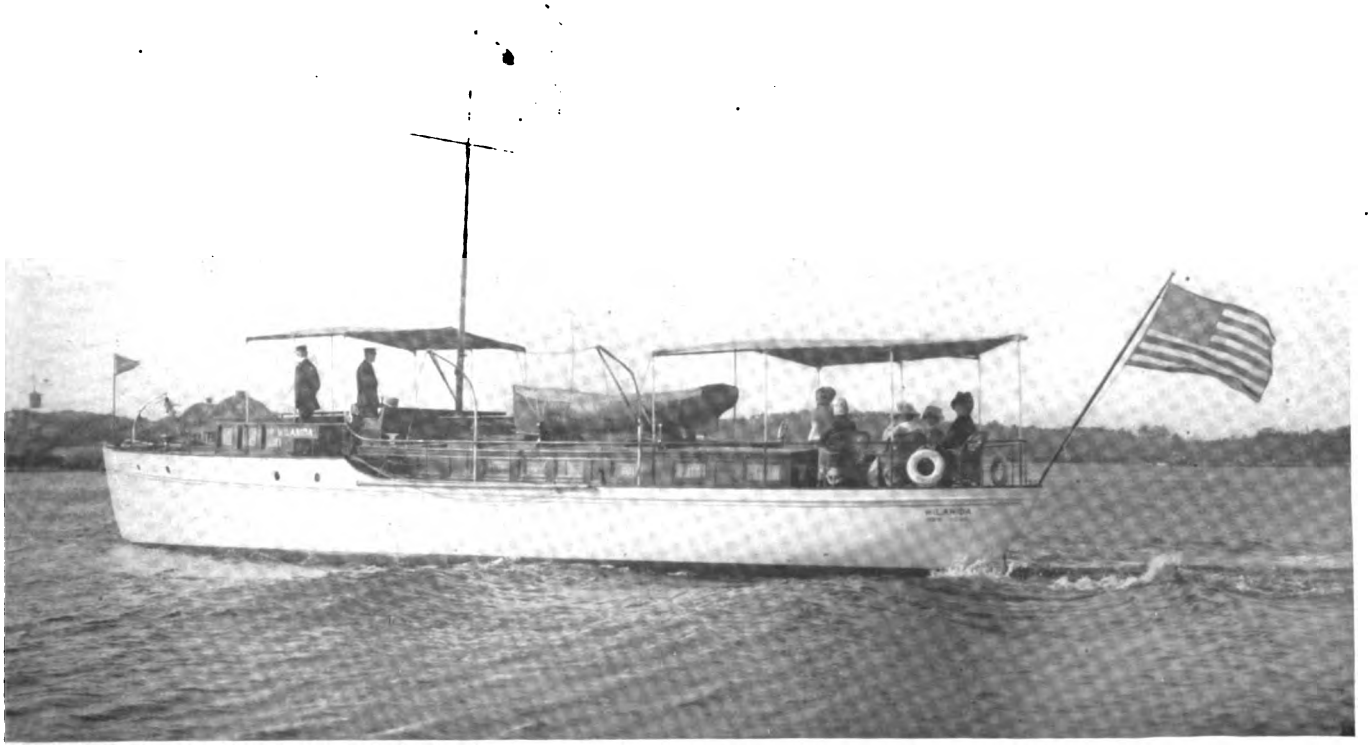
Success with ordinary ignition systems is simply a question of applying in practice the rudiments of electricity, which everybody knows. One of the commonest victims of neglect is the ordinary dry battery. When these batteries are put up in round form, as they frequently are and always used to be, they may rotate under vibration until the zinc binding posts of two cells touch each other, as shown in two places in Fig. 7, thereby short-circuiting the cells. The proper way to install dry cells is to separate them by light wood partitions, so that no amount of shaking can cause two binding posts or the attached connectors to touch each other. Many dry batteries are now put up in square paper cartons which prevent them from turning in the manner just described.

In the storage battery, the commonest trouble is corrosion of the terminals, a thing which must be prevented, if the tendency toward it appears, by periodic inspection and cleaning of the terminals. Neglect to recharge the battery when the voltage gets down to 1.8 per cell, neglect to see that the cells are actually fully charged when they are supposed to be, and failure to keep the density of the acid solution at about 1,250 when the cells are charged, are other common causes of trouble easily prevented.

Many troubles with the ignition apparatus are due simply to the user's failure to realize the elementary principles of electricity. Low-tension current, such as delivered by a battery or by a friction or belt-driven magneto, requires wiring of fair size to carry the current, owing to the fact that the current, though of low pressure, is of relatively large volume. Number 16 wire is about right for ignition work, but 14 or even 12 should be used for electric lights and horns in order to avoid materially wasting the current in wiring resistance. Since the current pressure is low, the insulation presents no difficulty and only ordinary care is required. High tension current, required in ignition apparatus using jump spark plugs, is entirely different in its behavior. This current is of very small volume, but of pressure so high as to break down or penetrate rubber tape and other simple insulating means, such as suffice for battery current. Distributors, spark plug porcelains, and high-tension terminals aboard a boat must be kept scrupulously clean and dry.

If the spark and throttle control levers are not mounted true on the engine but are carried forward or aft to the wheel, as they should be, don't take chances with the connections; that is, don't use small wire and cheap bell-hanger bell cranks. Sooner or later those things will break or work loose, or get tangled up, and then you will be suddenly deprived of control over the engine when perhaps you need it most. There are good substantial control connections made for motor boats, and it is economy to have them.

In conclusion, don't forget that ten minutes' head work is often worth an hour of aimless tinkering. Every trouble that you experience has a definite cause or causes. Very little study will usually disclose these causes and point the direction in which correction should be made.



Wilanida. 68 Feet O. A., Twin-Screw, 40-H.P. Lamb Engines. Owned by Wm. C. Atwater, Westhampton, L. I.

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Westward. Owned by Mr. Alexander S. Cochran, N. Y. City

Photos by A. E. Beken & Son, Cowes, I. W.

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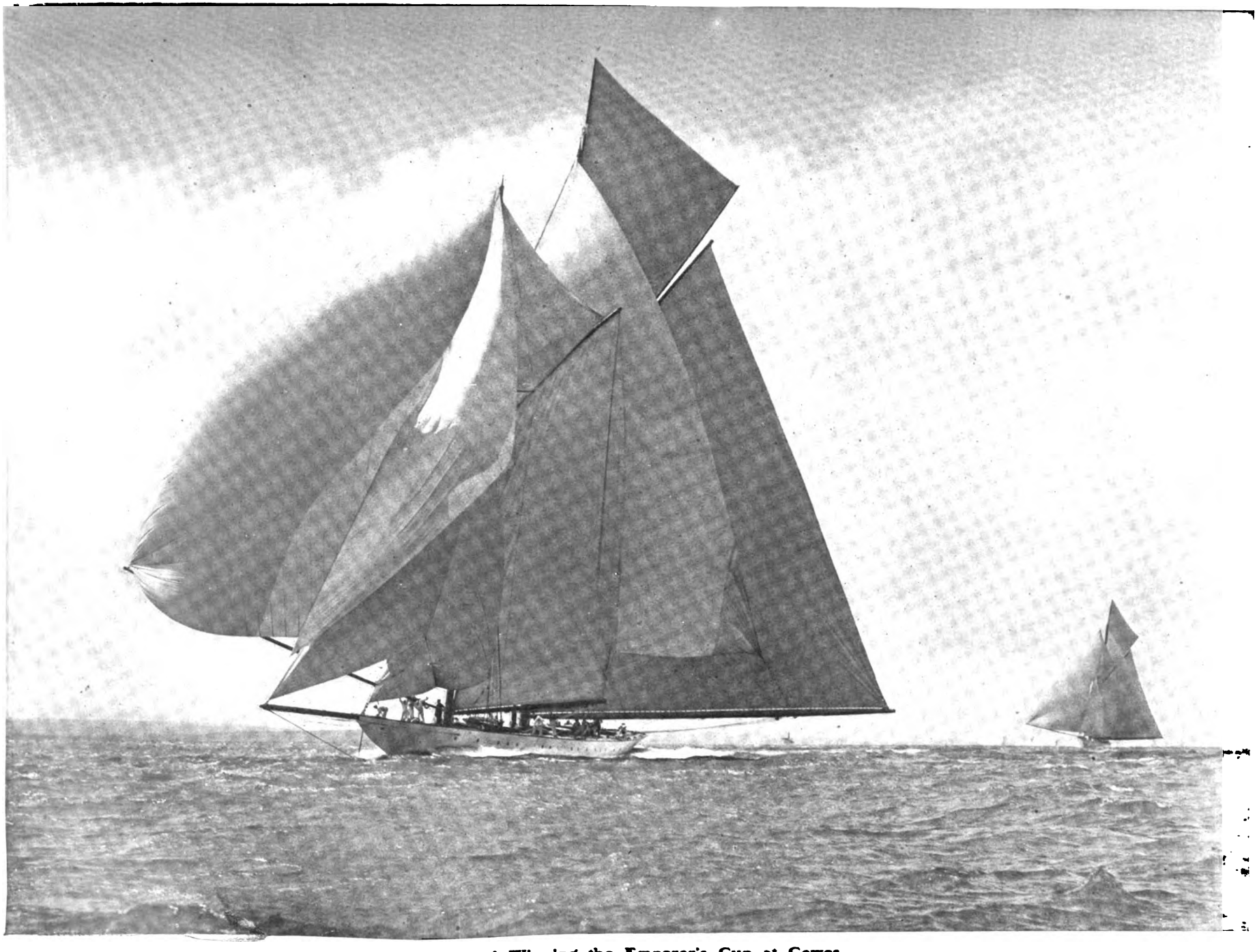

Westward Winning the Emperor's Cup at Cowes

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NAVIGATING THE AIR

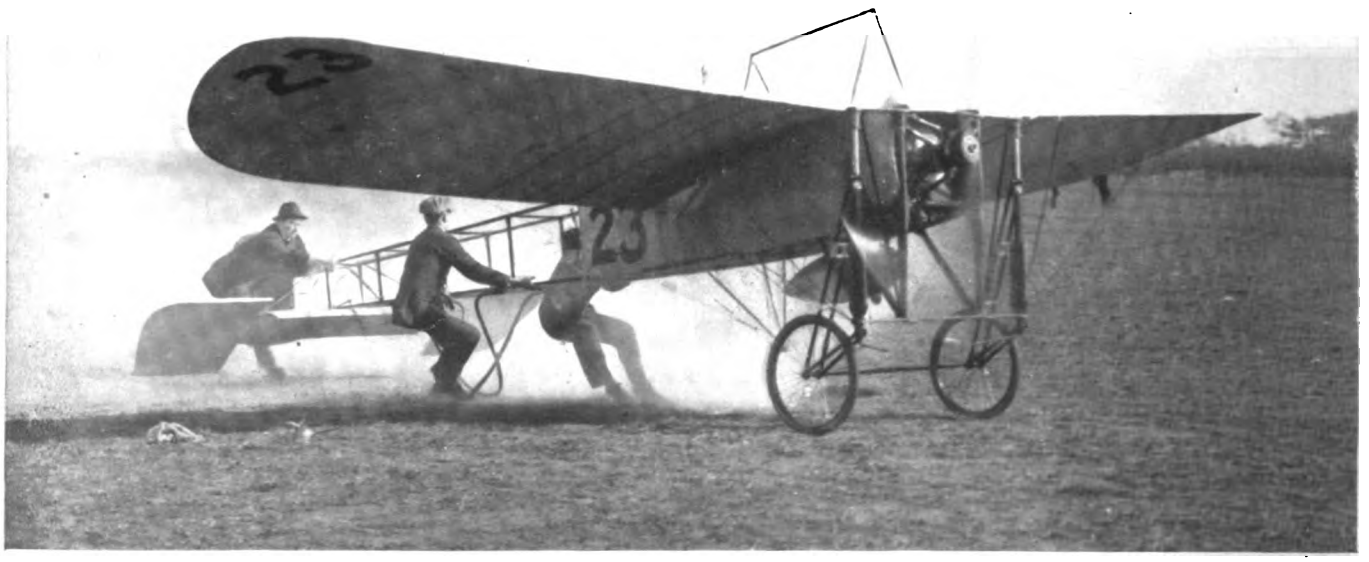
Winfield M. Thompson

Flyin' shud be left to professyonals. They take th' risks, an' they take th' money f'r th' risks. Th' first thing a man ought to do in thryin' to be a burr-rd is to practice fallin'.—Mr. Dooley.

SAILING as a sport was a thing of such slow development that no one generation of men could claim to have witnessed its inception. The same cannot be said of flying. In spite of more than a century and a quarter of ballooning, the aeroplane shot across the 20th century sky as unheralded as a meteor. Its relation to ballooning might be compared to that of the swift power boat to the aimless hulk that must go where the winds and currents send it. Yet there are many people to-day, naturally slow in grasping fundamental facts, who fail to distinguish between the balloon and the aeroplane, between aeronautics as represented by a drifting bag of gas, and aviation as represented by a pair of wings driven by a high-powered gasoline engine; between mere floating in the air and flying.

The dirigible balloon, so-called, is responsible for this confusion among the undiscriminating, for it is driven, in theory at least, and when winds are fair, by a gasolene engine. But even in the face of Count Zeppelin's success in Germany with giant dirigibles of the passenger-carrying type, the balloon, in all its forms, remains the last chapter of another century's achievement in air navigation. Walter Wellman's attempt to cross the Atlantic in a dirigible, which would have been ridiculous if it had not come so near being tragic, brought home to Americans very plainly in the autumn of 1910 the limitations of the power-driven gasbag. Its huge bulk could not be forced against a strong breeze, and in spite of its engines it could do no better than drift with the wind. Count Zeppelin with rigid compartments to hold his gasbags, and with greater power and stronger construction all around, was able to make a better showing in a strong wind than the ill-prepared Wellman; yet the fact remained in his case that the bigger his balloon the greater target its bulk made for the breezes, and that a gale could wreck a Zeppelin on the tree-tops of a German forest quite as readily as a lesser breeze could blow Wellman from Nantucket to the latitude of Hatteras.

Between the Montgolfier brothers of France, who in 1783 gave an exhibition before the king at Versailles of their newly invented hot-air balloon, and Zeppelin and other experimenters with the dirigible, there was but one new idea: the employment of the gasolene engine. The engine has proven itself here, as in boating, a dependable machine. That it has done no better is the fault of the vehicle to which it is attached. Certainly it has done much, as a Frenchman showed in the autumn of 1910, by flying from Paris to London in less than six hours.



A Bleriot Monoplane About to Fly. Note the Resemblance to a Huge Beetle or Dragon Fly

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But when all is said and done, the great, mechanically-driven gas balloon compares with the compact, self-sustained flying machine, as a means of covering distance, as the elephant compares to the hawk.

Germany has clung to the dirigible, from its loyalty to Count Zeppelin, and has been distanced in consequence by other countries in the development of the aeroplane. In this the United States has led, owing to the discovery and application of the basic principles of flying by two Americans, the Wright brothers, Wilbur and Orville, of Dayton, Ohio. Many other good men had tried to fly before them, but there is little doubt that had the Wrights not persisted with their experiments, manflight would not have reached its present development. All the other inventors of machines now in practical use have employed the principles established by the Wright Brothers. The brothers claim patent rights on the principles, but as yet no court has passed on the matter, and the other flyers are using their machines under the protests of the Wrights. The claims of the later flyers, varying in detail, but alike at bottom, are that there were flying machines invented before the Wrights took the field, and that these early machines contained certain features, which have been perfected in the present day, and that therefore the Wrights can lay no claim to those features. The Wrights, who are keen, kindly and broad-minded Yankees, admit the fact that there were earlier machines than theirs, and acknowledge their indebtedness to some of them for ideas; but they add, rather dryly, that the early machines didn't fly.

Certainly the Wright brothers were the first men to operate successfully a mechanically-driven aeroplane. Others had experimented with so-called gliders—planes without power—and it was one of these, invented by Octave Chanute, a Chicago engineer, (who died Nov. 23, 1910), that the brothers adopted as the model for their flying machine. This was done on the invitation of Chanute, who had carried his work as far as he could. Others had attempted the same thing as Chanute, including Otto Lilienthal, a German engineer, who between 1891 and 1896 had made about 2,000 flights from the summit of a small hill to its base. He was killed by his machine losing its balance. Coupled with the names of these two experimenters are those of Hiram Maxim and Prof. S. P. Langley. Maxim in 1899 built a huge machine to be propelled by two steam engines. It had 4,000 square feet of lifting surface—the latest Wright machine has 130 square feet—and weighed when ready to start about four tons. It was wrecked in the first attempt to start it. Langley's machine was also wrecked in starting, and the ridicule with which his attempt was greeted in the press drove the old man to his bed, from which he never rose. Yet Langley had made small models, mechanically driven, which he had flown successfully; and now that the puzzle of flight had been solved, tardy credit is being given to Langley for having invented a machine that in all probability would have flown and carried a man in the air, had his experiments been carried a little further.

Possibly the reader of these lines may wonder that all these bright experimenters, who came so near accomplishing the great feat, were unable to fly. One simple reason accounts for their failures: none of them learned to control a machine in flight. They could make a machine that would fly, and lift weight, but they could not make it behave. The simple physical problem of equilibrium, of maintaining the center of gravity and the center of air pressure on the machine in the same vertical line, eluded them all. If the downward pull of the center of gravity is ahead of the center of air pressure, the machine pitches head foremost to the ground. If it is behind, the machine falls stern first. If at either side, it falls to that side. In unscientific language, the machine can be controlled so long as it can be kept going and on an even keel. The instant its centers change, something must be done to keep it from dropping like a plummet to the ground.

It was to this problem the Wright brothers directed their energies, and they solved it. This done, the whole art of flying was an open book. The secret that had cost Lilienthal his life, evaded Chanute, cost Maxim $100,000 for one experiment, and sent Langley broken-hearted to the grave, was guessed by the shrewd brothers from Ohio. The brothers experimented with the Chanute glider from 1900 to 1903, and on Dec. 16 of the latter year their perfected machine, equipped with a 16-horse-power engine of their own make, made its initial flight, of a few seconds, above the sand dunes of a bleak stretch of the North Carolina coast. Their next flight was 850 feet long.

Manflight here had its beginning. The brothers next turned their efforts to solving the secrets that lay behind the first chamber to which they had found the open sesame. They were a year learning how to make a turn in the air. When at last their experiments had reached a proper point, they demonstrated to their own satisfaction what could be done by the flying man, by covering 34 miles at a speed of 38 miles an hour. That was Oct. 5, 1905. The record was not made public at once, and the brothers kept on experimenting, until their machines reached the stage in which they are now seen.

But how did they accomplish what others had failed to do? Simply by throwing away the ideas of their predecessors, and striking out on a new line. Most of the experimenters before them had sought to preserve equilibrium by shifting weights or changing the angle of their wings. These were believed by the Wrights to be false theories. They made a rigid form of plane, but made its tips flexible and added a vertical rudder which operated simultaneously with the wing tip. Thus, if the wing tip is curved downward, by means of the controlling wires leading to the operator's levers, the tendency of the machine is to turn and rise on the end at which the tip is curved. A simultaneous movement of the vertical rudder in the opposite direction corrects this turning tendency. It is on this simultaneous movement, the chief element of their control of their machine, that the Wright brothers base their claims of infringment against other makers. This principle, in one form or another, is employed on all the machines now in use, but their inventors claim it is not original with the Wrights. They cite a glider made in Cairo, Egypt, in 1895, by L. P. Mouillard, which had flexible wing tips. The Wrights, however, have never claimed originality for the flexible tips, but for the simultaneous vertical-rudder control when operating the tips; and they claim also that the vertical rudder is their invention, and that it is absolutely essential, in conjunction with the wing-tip warping, to the control of a flying machine.

Such is the crux of the mechanical situation to-day in the sport of flying, and I have put it foremost because of the importance the mechanical side of the sport of flying will shortly assume in the business world. There seems little room for question that aviation to-day holds out the greatest lure to engine builders of any field to which they may direct their efforts in invention. The

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engines to-day in use on flying machines, while remarkable in their power and efficiency, probably will look crude half a century hence; and the man may be among us to-day who will work a revolution in them.

For the benefit of those who may not have gone as yet into the details of flying machines, I will give briefly outlined the distinctions between the various makes. There is going on at present in aviation what may be called a battle of types, reminding a yachtsman somewhat of the old-time controversy on the merits of the center-board and keel type of yacht. The difference between the biplane on the one hand and the monoplane on the other might be likened, without drawing too fine a point, to the difference between a schooner and a cutter. The biplane, without question, is the abler airgoing craft. The monoplane has shown itself, as yet, somewhat in the America's cup class—fast and showy, fine for exhibition work, but safer at anchor than underway in rugged weather.

It must be added, however, that neither type can claim exemption from numerous accidents, against which the flying men are unable to devise safety appliances.

Of the biplanes the Wright machine is by far the best; and, since the brothers have turned their hand to making fast as well as dependable machines, there is an open question whether it is not also the superior in speed of the monoplane. As the generic name of the machine implies, it has double planes. These are superposed, making a machine which some wag has described as "like a street car with the sides knocked out." The engine is placed a little off the center of the lower plane, and the operator sits beside it. There are two spruce propellers, each 8 feet 3 inches long, and each on a short shaft of its own, attached to the main shaft by means of chain and sprockets. The engine on the ordinary passenger-carrying machine is of four cylinders, rated at 30-horse-power. Its appearance is like that of a marine gasoline engine. The machine weighs with the engine and all its fittings 968 pounds. It has 606 square feet of supporting surface, its greatest span being 40 feet, and its length over all—from rear rudder to front control—41 feet. The planes are 6 feet 6 inches wide, with frames of hickory and American spruce, and covering of a light cotton fabric, treated with rubber. This is the original type Wright machine, which was started for flights from a light iron rail, being given its initial impetus by a weight dropping from a tower, and pulling a wire rigged over a wheel at the far end of the rail. For landing it was equipped with a pair of skids, like the sides of a country wood sled, which kept the planes from the ground. More recent machines have been fitted with stout bicycle wheels for starting, the rail being discarded, except in special cases, though the skids are retained. Of late also the front control has been discarded, as it has been found that the "headless" machine can be manipulated in rising without it, by means of the rear controls.

The standard Wright machine, here described, has been assailed by the critical on many grounds. It was a lumber wagon. Its construction was rough. The chain-and-sprocket device for transmitting power was antiquated and mechanically impossible, and so forth. These criticisms did not disturb the Wrights, who went right on making the lumber wagons, until there was an incentive to show that they could do when other things were needed. Then they jolted their critics by bringing out a machine having only 130 square feet of sustaining surface, and an eight-cylinder, 70-horse-power engine. This little machine made more than 75 miles an hour, and though it was smashed before it got into competition, through the stoppage of its engine in a tight place, it was in the air long enough to show its speed, that its surface was ample, and that the chain-and-sprocket gear worked as well in a racing machine as in the lumber wagons.

The Wright racer therefore marked the greatest single step in aeroplane construction in 1910, showing greater speed, on a smaller sustaining surface, than any other machine, and forcing the makers of monoplanes to the view that their speed laurels might in another year be snatched from their brows. "At this rate," said the aviation joker, "we'll be able in a little while to fit a seat on an engine and fly without any wings at all!"

A step in the direction taken by the Wrights in producing their racer was also made by Glenn H. Curtiss, inventor of another of the older American biplanes. Curtiss has always flown a light machine, differing little in principle from the Wright. In fact he is one of the principal defendants in the Wright suits. The effect of wing-warping is obtained in the Curtiss machine by means of flaps attached to the rear edges of the plane, connected, by wires, with a movable frame in which the operator sits. By moving his body, the driver draws down these flaps as required to maintain equilibrium, or to turn. The rudder is controlled by an automobile steering wheel. Attached to this also is a rod controlling the forward elevating planes. The machine is driven by one propeller, attached directly to the shaft. Curtiss' step forward was also in stripping his machine to the last square foot of surface. This he did by discarding the upper plane, and substituting for it a tiny plane no larger than one of those in his elevating planes. In short, he stripped his machine until it was a monoplane, and with a 70-horse engine in it expected it to make high speed. Unfortunately the machine was completed too late for decisive trials in 1910. It may prove a strong card for America in 1911.

The only other prominent biplane is the Farman, of French make. Its inventor, Henry Farman, secures control in the same way as Glenn Curtiss, by means of flaps, or ailerons, as the French style them. This machine also has one propeller. It is driven by a Gnome engine, the best thus far developed for flying machines, of which I shall add a description to this narrative.

Of the monoplanes but two need be mentioned here. The best known is that invented by Louis Blèriot of France, and bearing his name. For workmanlike construction and small number of parts it has no rival among flying machines. Resembling in flight a bird, or a huge insect, it satisfies the poetic ideal of what a flying machine should be. It is fast as well as beautiful, and some of the greatest achievements of the year are to be put to its credit. Unlike the biplanes, the Blèriot machine has its engine and propeller in front. The Gnome engine is used with a two-bladed propeller of built-up woods, in accordance with the usual practice. The propeller on a standard Blèriot is 6 feet 8 inches long. The extreme span of the wings is 28 feet, and the over-all length, from propeller to end of tail, 28 feet. Each wing is 14 by 6 feet. The wing surface is but 180 square feet, which fact led us to believe, when we first read of the Blériot, now less than two years ago, that its inventor was inviting sudden death. He was the pioneer of small flying surfaces, and his racing machines of to-day, though equipped with 100-horse-power engines, have considerably less sustaining surface than the original machine. The speed

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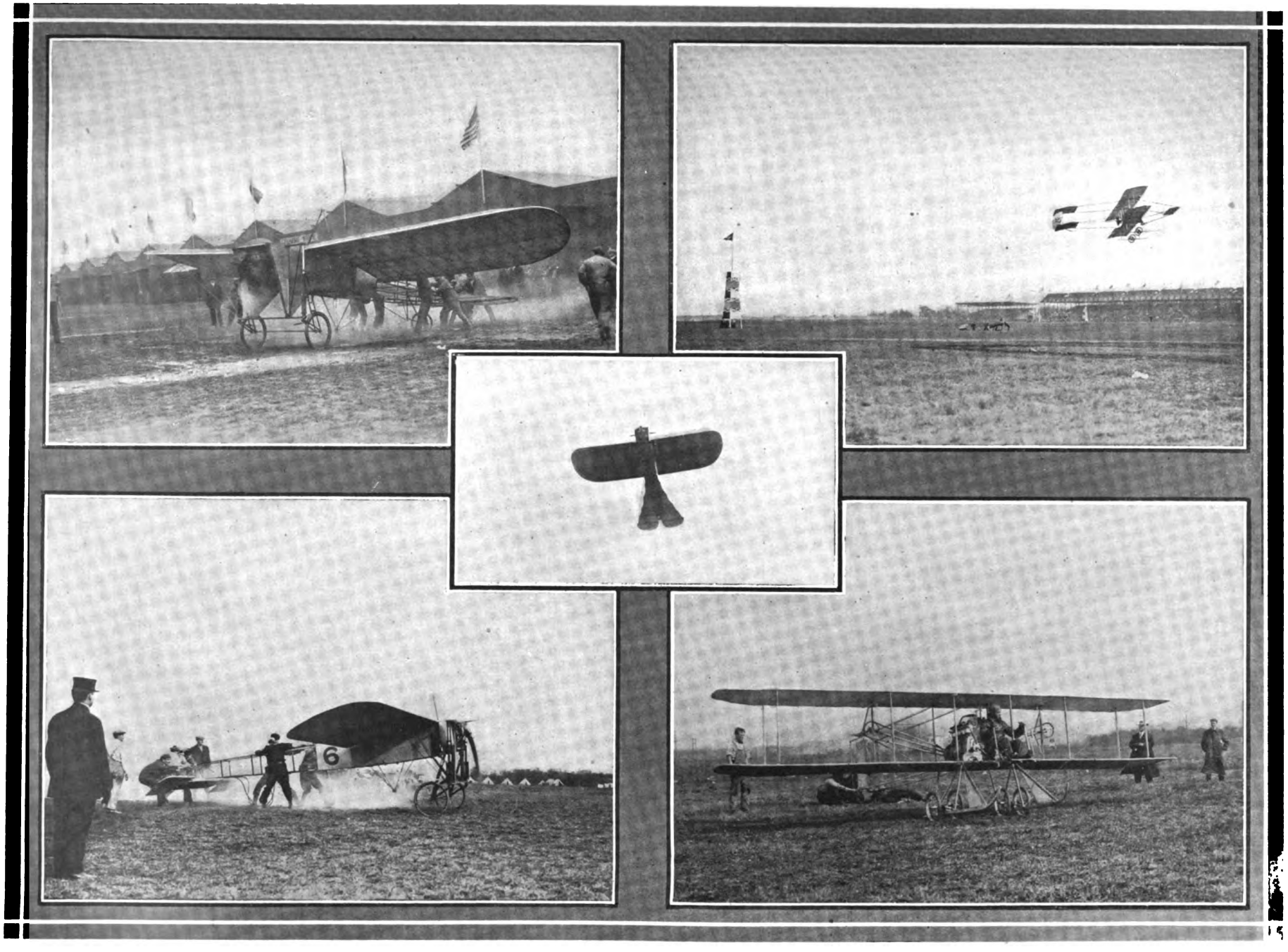

Views of the International Aviation Meet at Belmont Park, L. I.

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of a 50-horse Blèriot is about 55 miles an hour; of a 100-horse, about 67 miles an hour. No other make of machine has as yet surpassed their record in speed competition.

The Blèriot, however, is not without serious shortcomings. It is extremely difficult to handle in cross air-currents, and in turning corners on a racing course. It is a dangerous machine in starting and landing, particularly the latter. Owing to the position of the driver in the body of the machine, behind the propeller, he cannot see directly ahead, and is handicapped in picking out a proper landing place, as well as in judging the speed of his machine in landing; facts which have caused many bad accidents in the last year. The machine also has a tendency to collapse under severe driving, breaking usually at the joining point of the wings. It is, in fact, as delicate as it is marvelous, and only drivers who have discounted death and have a steady nerve should attempt to fly it.

But one other monoplane need be mentioned to complete the group of the leading flying machines of 1910. This is the Antoinette, the invention of Leon Levasseur of France. It is the largest of the flying machines, having a wing span of 46 feet. In supporting surface, however, it rates below the standard Wright and the Farman biplane, having 385 square feet. The distinguishing features of this machine are the angle at which the wings are set—an echo of earlier ideas that stability was due to the dihedral angle—the square ends of the wings, and the canoe-shaped body, of light mahogany, planked on lattice construction. The condenser coils extend along each side of the body, which is nearly 20 feet long. The engine is fixed, 8-cylinder, v-set, of 50-horse-power. The weight of the machine without its engine is 800 pounds, making it the heaviest machine built. Its extreme wing-spread makes heavier construction needful, and puts a strain on the wood framework of the wings that they cannot always stand in hard winds. The control of this machine, as in the others, is by warping the wings and manipulation of the combination rudder at the end of its tail. The driver's seat is in the rear of the body shell. There is a control wheel on either rail of the body, for manipulating the planes, and a foot bar, as in the Blèriot, by which the vertical rudder is operated. In this machine, as in the others, the mechanism can be understood only by careful study of the machine itself or elaborate diagrams, and cannot be described effectively in print by any but a technical writer, whose description would be understood only by technically-trained minds. Anyone, however, desiring exact knowledge of the mechanism of the monoplane or biplane, will find extended articles on them, with plates, in current technical publications.

Flying In 1909-10.

It may be said that flying as a sport had its beginning in 1910. Up to that time the aviators were busy experimenting. They had made flights of a few miles or a few minutes, and each better than the others had been set down as a record. The Wright brothers to be sure, had been as skilled for some years in the rudiments of flying as they were in 1910; but their work was scientific, and they made no effort to render it spectacular. As soon as they had shown the French, by their exhibitions abroad in 1908-9, how far they had advanced in the art of flying, a dozen flyers sprang up, full of confidence. First Louis Blèriot, who had been working zealously on his monoplane, startled England half out of its boots by flying across the English channel in one of his machines, and alighting, in half an hour after leaving his native shores, on a meadow near Dover. This was the first long flight across water. Hubert Latham had essayed it a few days before, without success. Blèriot accomplished it as easily as he had accomplished flights of similar length over the fields of France. His machine was damaged in landing, but he was unhurt.

This flight of Blèriot's was Europe's first great voyage in the air. A frenzy of flying enthusiasm seized France, and England did not escape the excitement. In August, 1909, came the first international aviation meet, held near Rheims. James Gordon Bennett, the veteran pioneer of half a dozen sports, offered the grand prize, the international cup for aviation, for the best time made around a 20-kilometer track (12.42 miles). There was also a cash prize of $5,000 to the winner. This proved to be Glen H. Curtiss, whose biplane beat Blèriot's monoplane by 5 3-5 seconds. His time was 15 minutes, 50 3-5 seconds.

This aviation meet was really the first uncertain step toward flying as a popular sport. Looking back at it, even a little more than a year afterward, one can see that the work done was insignificant. Yet the meet showed the flyers that what had been thought visionary was possible of achievement—that flying must thereafter be reckoned as one of the great sports.

The knowledge gained in 1909 was applied in the winter, and with the spring of 1910 a new flock of flyers took wing, who, with the old reliables, made the records of 1909 look small, and who soon began earning fabulous sums of money. The channel flight now looked easy. On May 21 Count Jacques De Lesseps, son of the builder of the Suez canal, flew from Europe to England. On June 2 the Honorable Captain Charles S. Rolls, an Englishman, made the round trip in a day from England to France and return, in a Wright biplane. A few weeks later he was killed by a fall, due to the breaking of the tail of his machine. On August 17 a young American, resident in France, John B. Moisant of Chicago, crossed the channel, with a man and a cat as passengers, on a flight from Paris to London in a Blèriot machine. Owing to accidents, due to bad landings, mechanical troubles and the like, he was about 30 days making the whole of his journey from the French to the British capital.

The crowning flight of the year in Europe was the scaling of the Alps by a young Peruvian, George Chavez, who on September 23 flew from Brieg, in Switzerland, by the Simplon pass, to Domodossola in Italy. The distance was but 25 miles, but the flight had to be made in part at an altitude of more than 7000 feet. Its last third was one tremendous glide, which resulted fatally to the brave young man who had accomplished this extraordinary feat. When he was but 30 feet from the ground, and seemed within a few seconds of safety, his machine collapsed, and plunged headlong to the earth. Poor Chavez was taken out of the wreck broken and bleeding, and on his deathbed told the story of his flight, saying that the accident was due to the breaking of the wings, which has been unable to withstand the pressure put upon them. Chavez covered in 40 minutes the distance that Napoleon's army, a little more than a century before, put behind them only by two weeks of man-killing toil. But for the weakness of his machine he would have come unscathed from scaling the icy heights.

The first notable distance flight of the year in Europe was from London to Manchester, 180 miles, for a prize of $50,000, offered by Lord Northcliff, publisher of a London daily newspaper. This was won by the French

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aviator Louis Paulhan, who made the distance in a Farman biplane, with but one stop, his elapsed flying time being 4 hours, 11 minutes. This flight served to bring into notice an English aviator previously little known, Claude Grahame-White, who later in the season developed into a clever exhibition flyer. White was a good second, covering 115 miles; but a spring gale, with very cold weather, prevented his completion of the course. He also flew a Farman machine. After giving some exhibitions in England Grahame-White came to America, bringing both his Farman and a Blèriot monoplane. He was the only operator of the year driving both a biplane and a monoplane. On appearing at an aviation meet at Boston he carried off the bulk of the prizes, to the amount of $22,000, including one for $10,000 given by a Boston newspaper for a flight of twice around Boston light, from an aviation field at Squantum, on the south side of the harbor, the total distance being about 33 miles. White used a 50-horse Blèriot in the flight. His time for the course was 34 minutes, 1 1-5 seconds.

The most notable long flight of the season in America, because the first, and over a dangerous course, was made by Glenn H. Curtiss, from Albany to New York, down the valley of the Hudson, 150 miles, with but one stop. This flight was made on May 29, and by it Curtiss won a prize of $10,000 put up by a New York newspaper.

On June 13 Charles K. Hamilton, in a Curtiss type biplane, made a continuous flight from Philadelphia to New York, about 90 miles. Subsequently he made the return trip.

In the summer of 1910 flying rapidly assumed the proportions of an organized sport in America through the eagerness of cities to secure aviation meets, and the willingness of wealthy men and newspapers to put up large prizes for competition. Los Angeles had started the year's program with a meet in January, at which Louis Paulhan was paid a heavy guarantee to appear. (His earnings for 1910 were about $100,000.) Chicago, St. Louis and other cities also had exhibitions. A feature of that at Chicago was the start of a flight of 187 miles from that city to the Illinois state capital, Springfield, by Walter Brookins, in a Wright machine. The flight was not continuous, as two stops were made, for fuel, but it won for the Wrights a prize of $10,000 given by a Chicago newspaper. The course was over a dead level of prairie country and a few towns, the time being 7 hours, 43 minutes, including stops. At a meet at Baltimore in November Hubert Latham made an extended flight over the city, in his Antoinette, winning a $5,000 prize given by a newspaper. The longest flight of the year over water was made by Glenn Curtiss, over Lake Erie, from Euclid Beach, Cleveland, to Cedar Point and return, about 120 miles. Another, made by a Wright machine, was over the Atlantic, along the beach at Atlantic City, about 50 miles. The closing flight of the season over water was made November 14, by Eugene B. Ely, in the employ of Curtiss, who rose from a platform erected for the purpose on the deck of the U. S. cruiser Birmingham, at anchor off Fortress Monroe, and landed at Willoughby Spit, about four miles away. The feat, though not so difficult as it looked, attracted favorable attention from naval men and the public. The machine used was the same in which Curtiss flew from Albany to New York.

The flights mentioned are but a few of the many that interested one part of the country or another through the American flying season. Both the Wrights and Curtiss maintained flying teams, of trained performers, who would appear at any county fair that could muster the stiff price. The price was forthcoming in an amazing number of instances, and the public became greatly excited over the new sport, to the enrichment of the men who a few years ago were dismissed with an indulgent smile and a tap of the head.

By autumn all sections of the country had seen more or less flying, and the public was ready for the big show of the year, the international meet, which fell to this country by reason of Glenn Curtiss' having taken the Gordon-Bennett cup at Rheims. Foreign nations were expected to send their best flyers to the meet. France and England did so, but Italy, Germany and Russia, not having developed sufficiently in flying to travel in fast company, were not represented.

The meet was held at the Belmont Park race course, 16 miles from New York, beginning Oct. 22 and ending Oct. 31. These dates were known in advance to be at least a month too late for favorable flying weather. Furthermore no effort was made to attract flyers by liberal guarantees. These facts notwithstanding, the international character of the meet attracted the largest number of aviators gathered in the name of sport to that date, there being 29, with 34 machines. Of these 13 were Blèriot monoplanes, three were Antoinette monoplanes, six were Wright biplanes, six Curtiss biplanes, and the remainder included a Santos-Dumont monoplane, a Nieuport monoplane, two Farman biplanes, and two biplanes of the Curtiss type. There were also three or four freak machines. The Gnome engine led all others, there being 15 at the meet. The most popular machine at the meet, with the public, was the Antoinette, operated by Hubert Latham of France, by all odds the best driver of that type of aeroplane. The most finished track driver there was Alfred Le Blanc of the French team, though Simon, French, James Radley and Grahame-White, British, and Drexel, American, showed driving form closely approaching his. All drove the Blèriot machine. Le Blanc's superiority was due in part to having the best machine at the field, built especially by Blèriot for the meet, and its driver also had an advantage in having been schooled for three months by Blèriot at track driving, for the express purpose of carrying the international trophy back to France.

In what might be called the substantial work of the meet, the Wright machines led all others. In duration and altitude, two of the severest tests of a flying machine, they were easily the leaders. The Curtiss machines for some reason not apparent, were not exploited in proportion to their reputation; while the new Curtiss racer was tried but once, unofficially, toward the end of the meet. Owing to the high winds every day for eight days, there were many accidents. The bulk of these were in making landings, and in this respect the Blèriot monoplanes were the greatest sufferers. It is very difficult for a driver of a Blèriot to estimate the speed of his machine in landing. Three of these machines were disabled in one day by striking the ground too hard, among them being the 100-hore-power racer of Grahame-White, which pitch-poled on the last day and landed on its back. Its driver escaped unhurt.

It is my purpose not to describe the meet in detail, but to mention its salient features. One of these was the great work done by the Wright machines in altitude competition. Although the wind was strong during the first eight days of the meet, the Wright high-flyers, Messrs. Ralph Johnstone and Arch Hoxey, were out, climbing until they disappeared above our heads. On Oct. 28

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the two rose in a strong breeze, which rapidly increased to a gale. They went up to a great height, and though stemming the wind with full power on, were swept so far from the track that Hoxey was obliged to land 22 miles, and Johnstone 55 miles away. Johnstone had attained a height of 8,475 feet. This was the only time on record when aeroplanes had maintained their balance after gathering sternway. In both cases they were driven stern foremost all the way to the points where they were brought to earth. Next day both flew back to the track.

On the last day of the meet Johnstone, in a machine built by the Wrights especially for climbing, attained the record height of 9,714 feet, directly over the field. He went up in spirals until invisible in a clear sky, and came down in hair-raising loops, at a steep angle, alighting finally in the middle of the field as lightly as a ball of cotton. He reported great difficulty in driving the machine in the rare atmosphere encountered above 8,000 feet from the earth. (This daring operator was killed November 17, at Denver, by a fall of 500 feet, his machine capsizing in making a very short turn. The cause of the accident was not determined at the time, but was said to be the collapse of the planes, due to improper strain. Johnstone's record for altitude stood but 23 days, as on November 23, at Philadelphia, it was excelled by J. Armstrong Drexel, flying a Blèriot, who made 9,970 feet. Drexel, however, landed 20 miles from his starting point.)

The international match, flown Oct. 29, in a gusty Northwest wind of 15 miles an hour minimum velocity, caused many disappointments. Latham drove his Antoinette until his wings were weakened, and he was forced to descend. The hopes of America centered in the Wright racer, but an accident to its engine sent it crashing to the ground before it crossed the starting line. Prior to this accident—from which Brookins emerged most luckily unmaimed—the race was a duel between Grahame-White, British, and Le Blanc, French, who had the only two 100-horse-power Blèriot machines at the meet. Both had started early and Le Blanc had the prize all but in his grasp, when on the 20th and last lap of the 62.1-mile course his machine crashed into a telegraph pole and was wrecked. The accident was attributed to insufficient fuel. Le Blanc's time for 19 laps was at the rate of 66.6 miles an hour. Grahame-White completed the course at 61 miles an hour, his time being one hour, one minute 4 3-5 seconds, and thus won $5,000 for himself and the Gordon-Bennett cup for England, where the international meet will be held in 1911.

On the day following the international race, the chief money prize of the meet was flown for, it being $10,000 put up by Thomas F. Ryan of New York for the best time from the field to and around the Statue of Liberty in New York harbor, the total distance being 35 miles. This race was the first to be flown over cities. The entire course was over settled country, and some miles of it presented only the roofs of Brooklyn or Long Island City to the aviator as a possible landing place. There was deep interest in the race, and hope at the track that it might be run off as a genuine sporting event, a hope not to be realized, unfortunately. At the beginning of the meet the rules stood that an aviator to qualify for this race must have spent an hour continuously in the air at this meet, that the race should be started between 2.45 and 3.45 P. M., and that it was to be open from a stated date to the end of the meet. The first rule was changed three days before the race. Grahame-White protested against the change, on the ground that the committee had no right to make it. He protested also against the subsequent change allowing a contestant to start at any time that would permit of his finishing before 5.30 P. M. The committee decided against him on both protests.

The first starter in the race was Count Jacques De Lesseps. He rose to 800 feet and steered a straight course for the tall buildings on lower Manhattan island. White followed in about three minutes. Both were careful to start within the hours required by the original rules. Both made a beautiful race. The wind was about 12 miles velocity, from North of West, against them going, and with them returning. White steered the longer course, going at first somewhat Southward from the track, and thence over Brooklyn to the statue, but he made the better time, by virtue of his more powerful machine. De Lesseps' performance was purely a sporting exhibition, and one that roused the greatest admiration for his pluck; for he started first, in a feat that had never before been tried, and at which, to a moral certainty, he would be beaten, barring accidents to his competitor. His time was 41 minutes, 56 seconds. White's was 35 minutes, 21 seconds. Both reported a trip without incident, except that over Brooklyn they encountered strange air conditions they described as "pockets," in which the machine dropped as if in a vacuum. For these they were unable to offer an explanation.

The English winner and French loser were being cheered by the crowd, and the band had just finished a medley of "God Save the King" and the "Marsaillaise," when an announcement was made from the official stand that John B. Moisant, an American, whose machine had been disabled in an accident that morning, has just bought for $10,000 Alfred Le Blanc's 50-horse Blèriot, and would enter it for the Statue of Liberty flight. Moisant started at 4.06. The wind had then fallen to less than five miles an hour. Steering a compass course, he went straight for the statue, rounded the captive balloon attached to it, and back to the field, where he was greeted with tremendous acclaim, while the band played "The Star Spangled Banner" and the officials shook hands with each other—for Moisant's time was 43 seconds better than White's.

White at once stated that he would make the course again the next day, the last of the meet. At the close of the day's flying the committee announced that the Statue of Liberty flight would be open the next day. That evening Mr. Moisant protested that the meet closed officially on that day, Oct. 30, and that the last day was an extra day. The committee ruled for Mr. Moisant, and declared that he had won the prize. Both De Lesseps and White were astounded when they heard of this ruling. White protested against it, on the ground that he was the only aviator in the flight who had qualified for it by having been an hour in the air at the meet; that he had started it between 2.45 and 3.45 as the rules required, and that the committee had no power to change the basic rules as they had stood at the first. He further protested against the committee's declaring the flight closed, and called attention to the fact that on Monday, Oct. 31, the so-called extra day of the meet, was actually an official continuation of the meet, by reason of one day, Oct. 22, having been lost, and wind checks having been given for its events; also because some of the most important official events of the meet were to be run off the last day, including the grand altitude contest, and the finals of the grand speed contest. None of these arguments availed.

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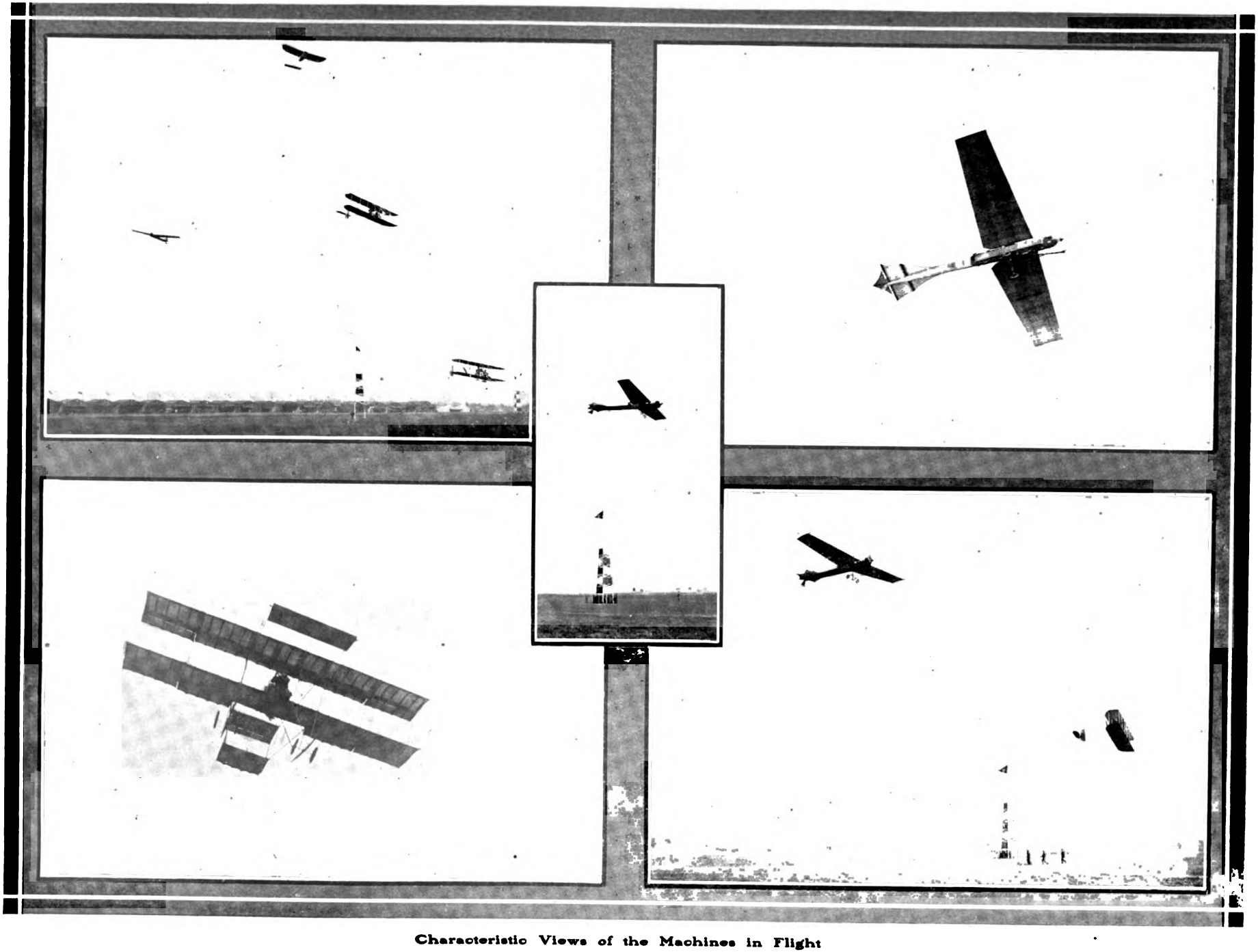

Characteristic Views of the Machines in Flight

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The last day might be official for all else, but it was not official for the Liberty flight.

On the questions of sporting ethics presented by the committee's rulings, the aviators at once took sides. Mr. Drexel, who had intended to compete on the last day for the Liberty prize, sided with Mr. White. The foreign aviators almost to a man declared the committee's rulings astounding and unwarranted. The business found its way quickly into social matters. The Aero Club of America, which the offending committee represented, was rent by dissention. The foreign aviators, bound home, expressed the heartfelt wish that it might be purged ere they should be obliged to visit our shores again.

Thus America's first international aviation meet, which really did a great deal to advance the science of flying, unhappily fell as a sporting event to the familiar level of the old days off Sandy Hook, when if you couldn't beat an Englishman in any other way, you could beat him by the rules.

ONE-TWO-THREE-FOUR-FIVE-SIX

Stanton M. Smith

TO those who love the gas engine the discussion of its many phases is a never ending joy. The subject has been treated thoroughly in THE RUDDER by several experts, but these observations may be of interest, coming from one who has no claim to expert knowledge beyond the practical handling of the machines for fifteen years. In this article the four-stroke cycle type only is under consideration.

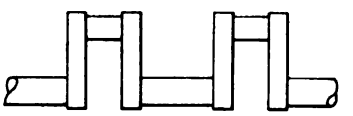
The one-cylinder engine, although a complete and economical power plant, is open to serious objections when applied to boat propulsion, especially in large sizes. The explosive impulse being delivered only once in two revolutions a jerky forward motion results, neither pleasant to the operator nor economical of the power developed.

The four strokes necessary to complete the cycle are most simply illustrated by the diagram shown in Fig. 1. In examining it bear in mind that the impulse and suction strokes are always towards the crank-shaft and the exhaust and compression strokes away from it:

← Complete Cycle. →	
← 1st Revolution. →	← 2nd Revolution. →
IMPULSE.	EXHAUST.	SUCTION.	COMPRESS

Fig. I One Cylinder Engine

To obtain more power, without increasing the size of the cylinder, another may be coupled with it to the crank-shaft. There is no arbitrary rule as to what interval shall be between the impulses, for they may be made to occur simultaneously, or the maximum of one revolution apart, or anything between those extremes that suits the fancy of the builder. To secure good results, however, and enable the two cylinders to work in harmonious wedlock, as soul-mates should, one of several methods of coupling must be adopted. Early practice was the V arrangement, one cylinder close in front of the other, both at a slight angle from the vertical, and coupled to the same crank-pin. In this construction the pistons rise and fall together, so that by firing the cylinders alternately an impulse is delivered once in each revolution. To obtain the same result in modern practice the cylinders are placed exactly vertical and further apart fore and aft; each is coupled to its own pair of cranks, and both pairs are on the same side of the crank-shaft, thus:



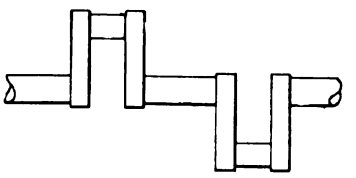
In either variation of this method, an imperfect mechanical balance may be obtained by the use of counter-weights, but the power is balanced and applied at regular intervals to the shaft. The four strokes of the cylinders in relation to each other in this method of coupling are illustrated by the diagram shown in Fig. II:

	← Complete Cycle →				
	← 1st Revolution. →		← 2nd Revolution. →		
Cyl. 1	IMPULSE.	EXHAUST.	SUCTION.	COMPRESS.	Imp. 1
Cyl. 2.	SUCTION	COMPRESS.	IMPULSE.	EXHAUST.	Imp. 2

Fig. II. Two Cylinder Engine. Cranks Together.

If the operation of the cylinders is not clearly understood, take a piece of copper wire and bend it to form a two-crank shaft; revolve this slowly between thumbs and fingers and compare it with the diagram.

While fairly satisfactory in small sizes, large engines with heavy moving parts set up too much vibration when coupled as just described, so another method is adopted. The crank-shaft is made with the pairs opposite, thus:



and the working parts of one cylinder move in the opposite direction to those of the other, effecting an excellent mechanical balance without counterweights. Unfortunately, however, the advantage of regular alternate explosions is lost, for both impulses occur in the first revo-

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lution, and both suctions in the second, as illustrated by the diagram shown in Fig. II-a:

	Complete Cycle.				
	1st Revolution.		2nd Revolution.		
Cyl. 1	Impulse.	Exhaust.	Suction.	Compress.	Imp. 1
Cyl. 2	Compress.	Impulse.	Exhaust.	Suction.	Imp. 2.

Fig. II A. Two Cylinder Engine. Cranks Opposite.

The piece of wire may now be made to conform to Fig. III by twisting the cranks opposite each other. In the endeavor to embody in one engine the advantages of both types without the disadvantages of either, the "double-opposed" method of coupling is used, in which two cylinders are placed horizontally and on opposite sides of the crank-shaft, the two pairs of cranks being opposite, or at 180°. The moving parts of one cylinder will travel in the opposite direction to those in the other, giving a good mechanical balance. The impulses will occur at regular alternate intervals, and the diagram shown in Fig. II illustrates this engine also. This type; although a distinct advance in these two respects, has met with limited favor because of its form, either of the vertical types being more convenient and more suitable for general use.

It has been seen that one cylinder gives one impulse to a complete cycle of two revolutions; also that two cylinders give two impulses to a cycle, and if at regular intervals they occur one-half of a complete cycle apart, or one revolution of 360°. With three cylinders there will be three impulses to a cycle of 720°, or one every 240° with cranks so spaced, and at regular intervals. To understand the three-cylinder engine clearly, get away from the idea that the cranks are at thirds, or 120°, for they are not, as regards the cycle, and that is what we must consider. Starting with an explosion in the first cylinder the next crank to come up, apparently one-third of a revolution behind is in reality one and a third behind. The circular illustration shows this plainly:

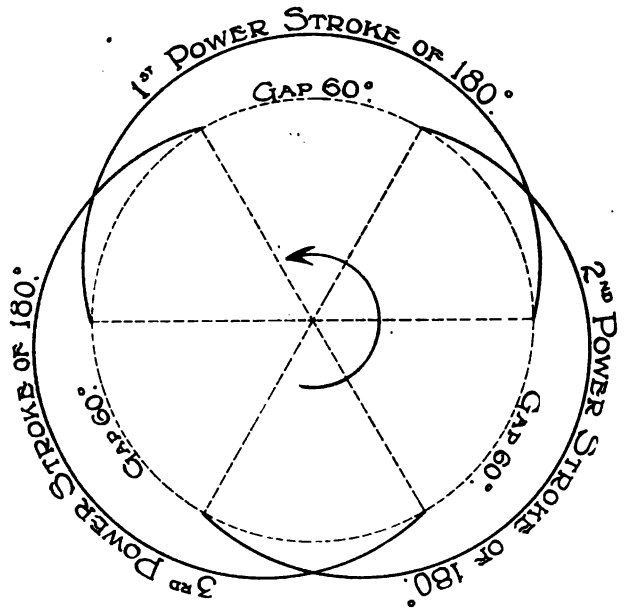


Diagram Showing Operation of Three-Cylinder Engine

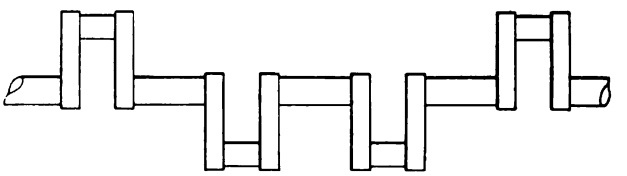
There is a gap of 60° between the end of one-power stroke and the beginning of the next. This may be verified by examining the diagram shown in Fig. III:

	Complete Cycle.											
	1st Revolution.						2nd Revolution.					
	60	120	180	240	300	360	420	480	540	600	660	720.
Cyl 1	Impulse.			Exhaust.			Suction.			Compress.		Imp. 1.
Cyl. 2	ion	Compress.		Impulse.			Exhaust.			Suct		Imp 2
Cyl. 3.	naust	Suction		Compress.			Impulse.			Ex		Imp 3.

Fig III Three Cylinder Engine.

A right-hand engine fires in the order shown, 1-2-3, if the cranks form a left-hand spiral; a right-hand engine fires in the order 3-2-1 if the cranks form a right-hand spiral. The three-cylinder engine is a splendid machine, applying its power evenly, and with little vibratio, and is very much better than a two-cylinder engine. It has a twisting vibration that is scarcely noticeable, unless run at an excessive speed.

In the four-cylinder engine we reach the practically perfect machine. To secure the best balance the central cranks are on one side of the shaft, and the end cranks on the other, thus:



which arrangement prevents a lengthwise rocking tendency. Such an engine may be set up on the blocks in the shop, not bolted or fastened down, and run up to several thousand revolutions a minute, without danger of jumping off the blocks. It is an easy engine to turn over by hand, because an unexploded charge of compressed mixture in one cylinder will push down and help bring up the next compressing piston. There is no gap between power strokes, although there is a gap between the actual effective strokes of power, for the force of the explosion is spent before the piston reaches the bottom; the engine cannot "claw under" the dead center, as a bicycle rider does by depressing his toes and pushing back. But this slight gap in power is no detriment in marine practice, for the the propeller works in a yielding medium. The fact that there are certain objections to such an engine when coupled to a wheel driven against an unyielding road surface has no part in this discussion. The succeeding strokes in the four cylinders are illustrated in the diagram shown under Fig. IV:

	Complete Cycle.				
	1st Revolution.		2nd Revolution.		
Cyl 1.	Impulse.	Exhaust	Suction	Compress.	Imp. 1
Cyl 2	Compress.	Impulse.	Exhaust.	Suction.	Imp. 2
Cyl 3	Exhaust	Suction.	Compress	Impulse.	Imp 4
Cyl 4	Suction.	Compress	Impulse.	Exhaust.	Imp. 3.

Fig IV. Four Cylinder Engine.

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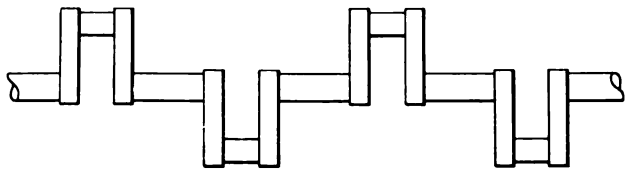
The impulses occur at exactly regular intervals in the order shown in the diagram, 1-2-4-3, in perfect rhythm. Were the cranks placed alternately opposite, thus:



the impulses would occur 1-2-3-4, and would be delivered to the shaft with the same rhythmic regularity; but the rocking tendency avoided in the other construction would be here present, so that it is not good practice. We have seen that the wide gap of three strokes or 540 between impulses in a one-cylinder engine is reduced to a gap of 180° in a two-cylinder engine (cranks together), to 60° in a three, and to nothing in a four, bearing in mind that the actual gap in effective thrust is a little more in each case; we are therefore still without continuous torque or turning effort on the crank-shaft, and to gain this another cylinder must be added.

This brings us to the five-cylinder engine in which there is always some one crank receiving a power thrust. There are five power strokes of 180°, or 900°, in a cycle of 720°, a total overlap of 180°, so that each power stroke is overlapped 36° by the next one. To have the impulses

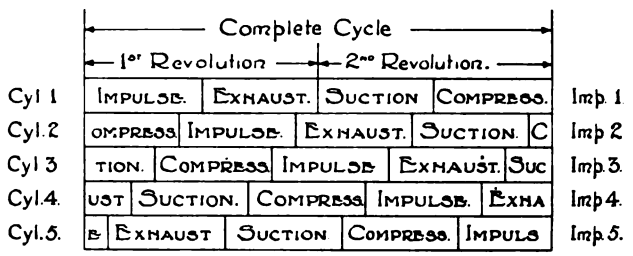


Fig. V Five Cylinder Engine.

occur at regular intervals they must be delivered to cranks set one-fifth of a cycle of 720° apart, or 144°. The crank-shaft may be built in either of two ways: The cranks may be set 72° apart, forming a spiral, and the cylinders timed to five on the alternate cranks which are 144° apart, and the order will be 1-3-5-2-4. With so many cylinders this is rather confusing when valves are to be set or igniters timed, and it is better to place the cranks so that the order of firing will be 1-2-3-4-5. This is readily done, for starting with the first crank at 0, the second will be 144°, or two-fifths around; the third will be 288°, or four-fifths around; the fourth will be 432°, or six-fifths; or, mark you, one and one-fifth around, and the fifth crank will be 576°, or one and three-fifths, leaving 144° to complete the cycle of 720°. The succeeding strokes in the five cylinders are illustrated in the diagram shown under Fig. V.

Beyond the one advantage of a slower speed being possible with the five, it is doubtful if it possesses enough practical advantages over the four to justify the additional expense and working parts. It is a fine machine for a large boat and a large purse. Having the fewest cylinders possible with continuous torque, it is the first to which an air-pressure, self-starting device may be applied. Even distribution of explosive mixture to the cylinders cannot be secured without an extremely complicated manifold.

The six-cylinder engine is a triple two-cylinder, or a double three, whichever you prefer to call it. To secure the best mechanical balance, the crank-shaft is a combination of a right-hand spiral and a left-hand spiral. The end cranks stand out at the same angle, the second and fourth, and the two center. The impulses occur at regular intervals, six in the cycle, in the order 1-2-3-6-5-4, as illustrated in the diagram shown under Fig. VI:

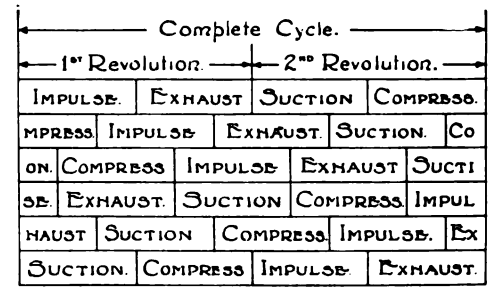


Fig VI Six Cylinder Engine.

There are six power strokes of 180° each, or 1080°, a total overlap of 360° per cycle, so that each is overlapped 60° by the next. In this engine high power is obtained for large boats without excessive cylinder sizes. Even distribution of gas to the cylinders cannot be secured without a complicated manifold.

In any four-cycle engine there will be as many power strokes in a complete cycle of two revolutions as there are cylinders, or in fact as many strokes of each function as there are cylinders. The impulses from any number of cylinders whatever may be distributed evenly throughout the cycle at perfectly regular intervals, nothing more being necessary to accomplish this than the proper spacing of the cranks around the shaft, and the correct timing of explosions.

Fidget. 36 Ft. O. A. Blount & Lowell Engine. Speed, 16 Miles per Hour. Owned by Richard Hutchinson, Boston, Mass.

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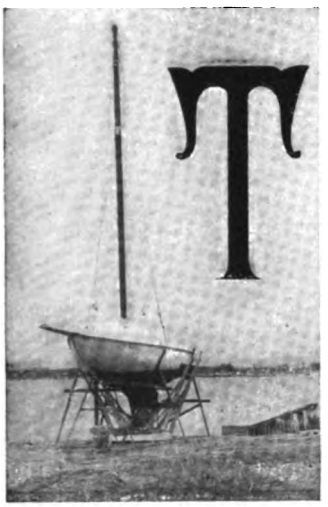
SIMPLE HAULING-OUT SCHEME



HERE are many amateur yachtsmen no doubt who would be pleased to haul out their own craft had they the proper gear and appliances, but the possession of a runway or hauling-out ways is something perhaps not easily possessed, and the scheme herewith revealed was devised by the writer to overcome the lack of adequate docking facilities or, to be brutally explicit, the "absence of the necessary cash to build a railway."

Well, to begin, I will presume that you have a boat, a place on the beach to put it, likewise an ocean on which the craft is floating eager to be hauled out to escape the wintry blasts. Good Heavens! Why didn't I put this in two months ago?

Perhaps I can best explain the scheme and the method of working, by stating how we personally work it in practice. This is how: our beach is located on a bay, which has a rise and fall of about six feet of tide, the beach being a gentle slope, with about 75 ft. between low and high-water marks. When we first arrived at this beach we thought some of building a regular fancy runway, with greased slides, etc., but being naturally lazy and being in a neighborhood near several shipyards the railway never got beyond the "talk" stage, so we planned and executed as follows: First, we made the cradle or support for boat, a very necessary part of the scheme and a part to be substantially constructed. Our cradle consists of three planks of yellow pine 16 inches wide, 3 inches thick, and 10 feet long. These planks form the fore-and-aft members on the bottom of cradle, and have the fore ends cut up sleigh fashion, and when placed apart form a foundation, if we may call it such, about 6 feet wide. So far the cradle should look something like this (Fig. 1):

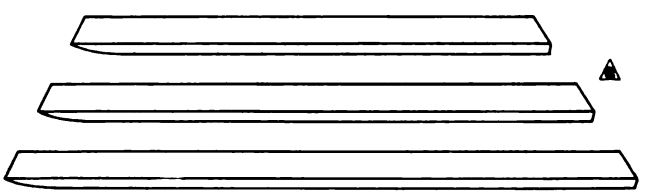


Fig. 1. Bottom Planks of Cradle

We then secure five pieces of the same three-inch stuff, about 8 inches wide, and spike them across the bottom planks or skids, leaving the pieces projecting from 18 inches to 24 inches on either side which makes the contraption now look something like Fig. 2 from above and something like this from a worms-eye view of the bow (Fig. 3):

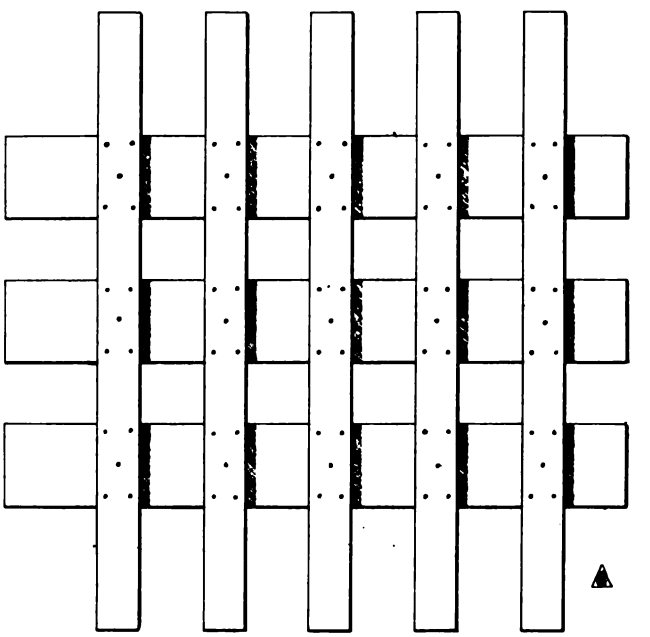


Fig. 2. Cradle with Cross-Beams in Place

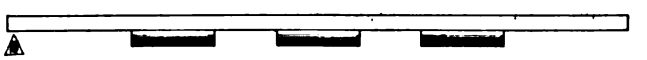


Fig. 3

The cradle has now been finished up to the point where a little judgment has to be used regarding the best method of supporting the particular type of craft to be hauled. In our case we had two boats, one a 40-ft. sloop with a section something like drawing, and which we supported in the manner shown in Fig. 4:

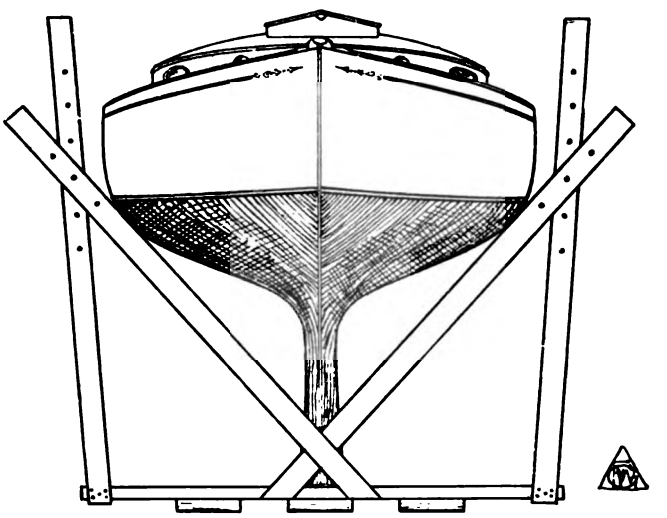


Fig. 4. Keel Boat on Cradle

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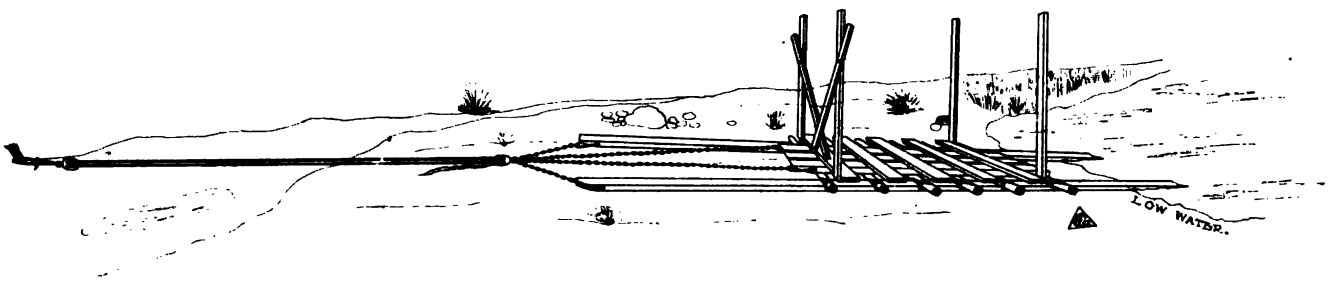

Fig. 6. Cradle at Low Tide Ready to Receive Boat at High Water. The Artist Forgot the Rocks

Two uprights amidships on each side, securely spiked at the lower ends, each pair with a couple of substantial 4x4 joists placed athwartships under hull in the fashion depicted. How these were secured will be shown later, as we are a bit to windward of the yarn. The other boat was a heavy 32-foot by 9 power cruiser, which had a heavy guard rail (darn good thing, for many reasons), and which we secured thus (Fig. 5):

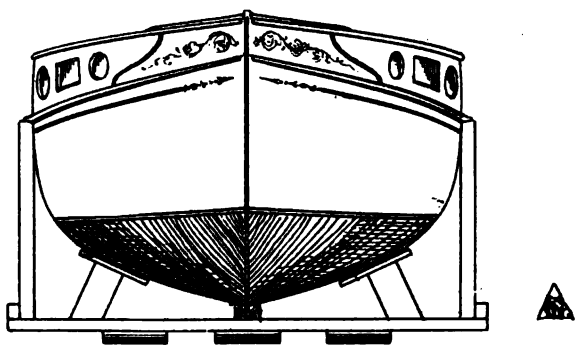

Fig. 5

Be sure to have a saw handy to lop a little off a poorly guessed length of upright if you place it under guard, and do not be too proud to put a piece of blocking, as shown, under each bilge, as she comes out of the water. But again I am beating the thread of the story. We now, I hope, have arrived at the point where we understand how to make the cradle, and a partial understanding as to how to place the craft on the cradle, but as yet we have no provision for hauling the whole outfit up the beach, and how to do this follows; in fact this is the only excuse for the whole yarn.

The common or garden variety of makeshift railway (outside of shipyard rigs), as we had seen it prior to devising this scheme, was a spiked-down plank affair with rollers between boat's keel and plank, or a cradle similar to ours, which had to be located at low tide, and boat placed on it, which sometimes was a fierce job, particularly in rough weather, and on the whole a very unsatisfactory heartbreaking task. The husky brother and I "Counceled of War" and decided on a plan of action whereby we would haul a boat without laying a permanent railway wholly in advance, whereby we could haul her in water not absolutely smooth, and whereby we didn't have to be so —— particular where we got the boat, since finding the aparatus and holding it and the boat exactly there at 2.35 A. M. until she grounds on the cradle is no cinch, especially for only two persons, and brothers at that. Enough said—what we finally devised proved so simple that hauling out the Mauratania to us would now be a mere diversion. Harken! At low water we placed two long planks somewhere near where we decided to haul out, not necessary to be too particular. On these planks we placed about six 2¼ or 2½-inch diameter iron pipe rollers, each securely lashed to planks with marline, then on top of this we placed the cradle nice and square with the planks. Get her straight! Get her straight! It's half the game. Then we lashed the whole blame thing together and piled on large rocks to hold it in place. Getting the rocks is a dirty, back-breaking job, and it is better to let brother do this part, since it is not in the scientific department anyhow. The thing then looks something like Fig. 6 at low tide.

For hauling tackle we use a two-fold purchase rig with the hauling part led to a winch which we stole from a sunken canal boat and which makes the job of hauling a cinch, if you have some friends or neighbors who will dash to the scene after the first few loud clanks of the windlass. Note—do not oil the winch at first, it kills the noise. But as I was saying, or writing, we secure our hauling tackle by passing a couple of chains wholly around the cradle, between the fore and aft pieces, and then we are ready for high water and the boat to be hauled.

When all is ready we haul the boat inshore until she floats over the cradle and between the uprights, previously having marked on the side of boat the points where uprights should come in order that boat's keel may be centered on cradle (we tack an upright forward between the planks), and the tub now floats as shown in the next

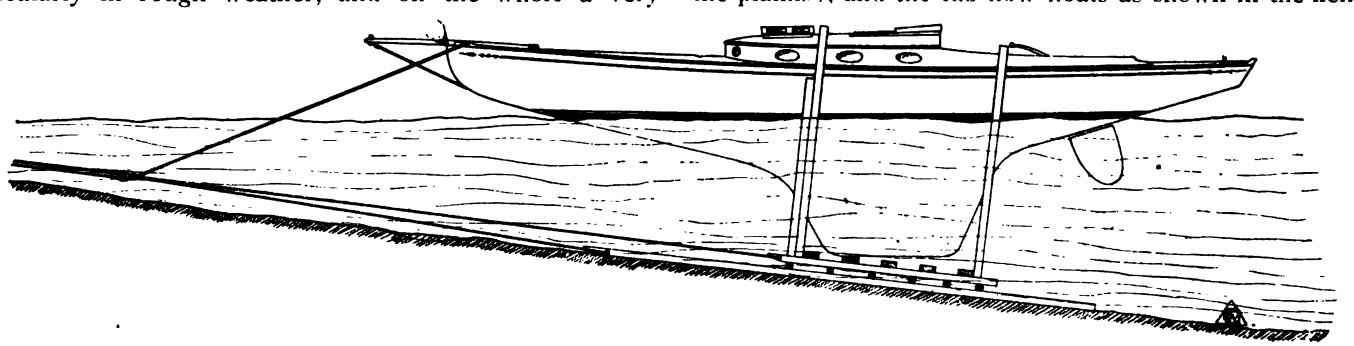

Fig. 7. Boat on Cradle Ready for Preliminary Hauling

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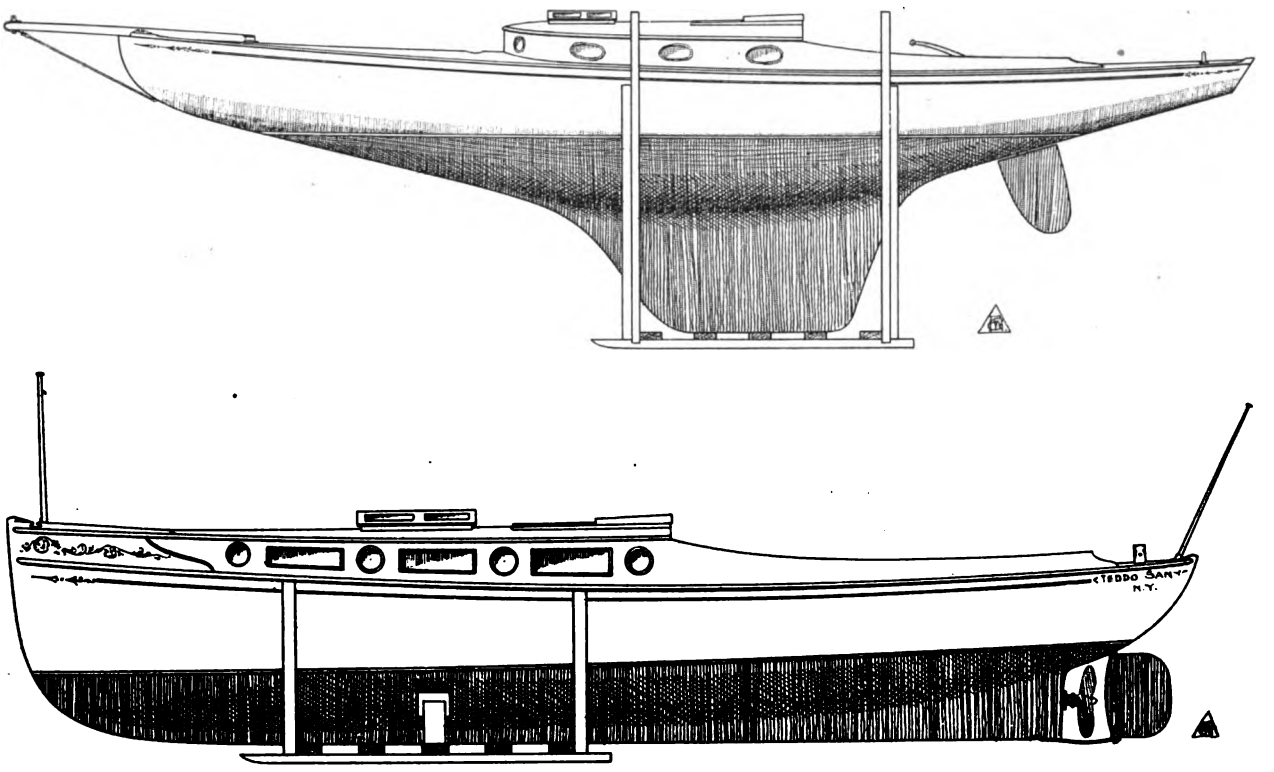

Figs. 8 and 9 Show How the Boats Look on Cradle, Except That the Cradle is a Trifle Short and On Fig. 9 Too Far Forward

sketch if all has gone well and no fights have taken place. I may state that the latter is a rare condition (Fig. 7).

From the bow of the craft a cable is now secured to the offshore block of the hauling part in order that the boat and cradle may all be hauled together. This is very important. After a few hauls it will be found that the whole affair comes sliding up the beach—boat, cradle, and planks. By the way, the first two planks also have to have the sleigh bows mentioned in describing the cradle skids. If the beach is sandy, the whole outfit may be hauled up until the craft is well out of water (stern is water borne a long while); and in the case of our keel yawl, 40 feet over all, 28-foot water line, 9-foot breadth, and 4-foot 9 draught, the boat several times came up on the first haul before tide left her, until she showed at least two feet of underbody at the bow, the stern, of course, being about on the water line. In the case of the launch, she of course with her smaller draught floated higher up on the beach, but did not come as easy after she once grounded. This, incidentally, was the opposite to what we expected. A deep-thinking scientist informed us that the launch with her lower center of buoyancy, and many other strange things, would come "right out." Pouf, for him! It worked out this way: We first hauled the yawl, and out she came forward, *because* we were only pulling the forward half, the after half being held up by the partially submerged overhang. The launch having practically no overhang came out about six inches, and then lay down on the beach to be hauled by brute strength (pardon, neighbors). So much for the theory of it, which really doesn't belong in the story, and is only put in to annoy the prominent naval architect.

The boat being now on the cradle and the cradle on the rollers, which in turn rest firmly and in perfect alignment on the "track," we call it, all one has to do is to strut around awhile until the tide drops a bit, and after cutting away beforementioned lashings and looking to hull supports let your friends work the windlass while you shift rollers, and with their assistance later on place more tracks or planks in position. As the boat comes up considerable on the first haul, only a little pull will put her out of harm's way, and she may be finally placed at once or left until some more opportune time if the amateur riggers and stevedores prove scarce on that particular Sabbath.

WALTER M. BIELING.

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HOW TO BUILD A SCOOTER

H. Percy Ashley

SCOOTERING now ranks as one of the standard sports. The first organized Scooter race was held in 1903 at Islip, on the Great South Bay, Long Island. There were twenty entries. The course was triangular, two miles to a leg, and sailed over thrice, making a total distance of 18 miles. The time of the winner was 48 minutes and 28 seconds. The first round was made in 15 minutes and 20 seconds. The time was slow, owing to the poor condition of the ice. The Scooter can do about 25 miles an hour under the best advantages, such as a strong, free wind and smooth ice, but as the sport is only in its infancy, and as there are plenty of points about the boats capable of improvement, it is possible that after they have steadily raced for several seasons that it will do much better.

The beauty of this boat is that it can be used the year round in the water and on the ice. Deep snow is the only thing that bars it out. If you strike a calm when on the water you can out oars and go ahead; if on the ice with no wind you can stand up in the Scooter and with the pike-pole shove to your destination. It is great sport to run from the ice into the water and out again upon the ice. They are the only boats I ever saw that can sail on soft or rotten ice.

You can use a Scooter in the fall for duck-shooting, in the winter for sailing on ice or water, and in the summer for fishing or rowing. What more can one require of a boat? The steersman of these craft is the jib-tender, as they are steered by the jib. Hauling in the jib pays her headoff, and slackening it up lets her luff. The jib tender is stationed at the forward end of the cockpit.

A slight scratch by trailing the small pike-pole will bring the Scooter to the desired course. The long pike-pole with the hoe attachment is to pull the Scooter from the water to the ice. This pole is unnecessary if the boat has enough speed on to drive her out on the ice. The pike attachment is to push with. A pair of 8-foot ash oars are also carried.

For handling the jib use canvas gloves; any other kind do not fill the bill. These can be fitted over a pair of woolen ones. Much of the handling of a Scooter is accomplished by shifting the live weight fore-and-aft. If the weight is brought aft the bow lifts, owing to the rocker runners, and the bow swings off from the wind, and vice versa if the weight is moved forward.

The plans of the Scooter given are not those of one of very light construction, but of a serviceable, speedy type of these strange craft. There are hundreds of these boats on Long Island, and the U. S. mail is carried in them during the winter. The fishermen and life-savers use them in all kinds of weather, and many a life has been saved by the Scooter, while accidents caused by them are very rare.

These boats can be found at any time during the winter ready for sailing. To get to them take the Long Island Railroad to Bellport and see Captain William Kreamer at the Wyandotte Hotel, and get him to take you scootering.

THE RUDDER Scooter holds from two to four, the load carried depending upon the strength of the wind. A rough estimate of the cost of a Scooter complete, including material and labor, is $100.

SPECIFICATIONS OF SCOOTER.

In carrying out these specifications it should be clearly understood that all materials are to be of the first grade, the wood fully seasoned and free from knots or checks. The entire construction of the hull is fastened with brass screws, not a nail being used, the only exception being the iron bolts that fasten the runners to the hull.

Keel and Stem—Shall be of white oak, the stem being of the usual form in a boat of this type. The keel or middle plank extends full length of the boat and is ¾ of an inch thick, tapering to ½ inch at each edge to match with thickness of planking. Width of keel 3¾ inches.

Frames and Deck Beams—Are spaced 11 inches from center to center, and are of oak of the following dimensions: 1¼ inches by 1¼ inches; they are steamed and bent to shape; they are in one piece and extend to side board or wale. The deck beams are of the same dimensions as the frames. The two are fastened by an upright of ½-inch pine, that is fitted close to the side board; the breadth of the pine upright is 2 inches.

Planking for Hull and Deck—Of selected white pine ½ inch thick and 4 inches wide, fastened with 1¼-inch brass crews. Decks laid parallel with the king plank.

King Plank—Runs full length and is ½ inch thick and 3½ inches wide.

Side Pieces or Wales—Are each in one piece, extending full length of boat, and are 3½ wide and ½ inch thick.

Cockpit Coaming—Oak steamed and bent, as shown in plans, ¾ of an inch thick and 4 inches deep. The height above the deck is 2½ inches.

Finishing—The wales, mast bench, king plank, cockpit coaming and stem to remain bright and be covered with two coats of varnish; hull two coats of white paint; the deck to be painted either straw or light olive color.

Sails, Rigging, Etc.—The knockabout rig is as follows: Mast 8 feet 6 inches by 3½ inches; boom 12 feet 6 inches, center 2¾ inches, tapering to 2 inches. Sprit 12 feet, center 2½ inches, ends 1¾ inches; jibboom 8 feet 6 inches, center 1½ inches, ends 1 inch. The bowsprit is 5 feet 6 inches long and 3 inches by 3 inches at largest part. The dimensions of the sails are as follows: Mainsail—hoist 6 feet, boom 12 feet, leech 14 feet, head 7 feet; jib on foot 8 feet, leech 6 feet, stay 10 feet. Area of canvas—mainsail 77.98; jib 22.50; total 100.48 square feet.

Dimensions of Racing Rig—Mast 13 feet 6 inches, diameter 3½ inches; boom 16 feet 9 inches, diameter center 3 inches, ends 2½ inches; gaff 8 feet 6 inches, center 2¾ inches, ends 2 inches; bowsprit 6 feet 3 inches by 3 inches by 3 inches; extension outboard 3 feet. Sails—mainsail, boom 16 feet, leech 17 feet, gaff 8 feet, hoist 7 feet; jib on stay 12 feet, foot 9 feet 3 inches, leech 8 feet

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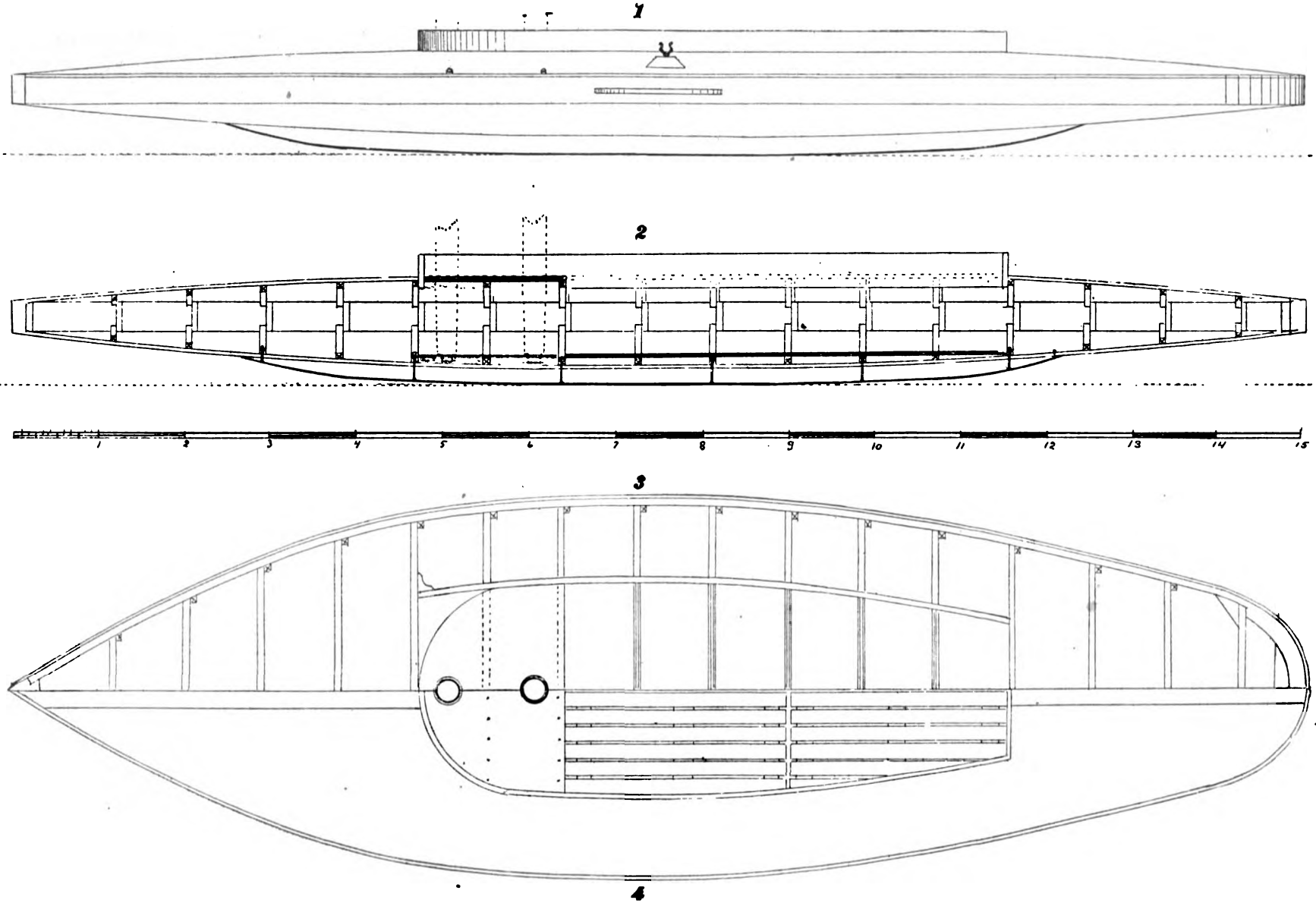

Construction and Arrangement Plans of Scooter

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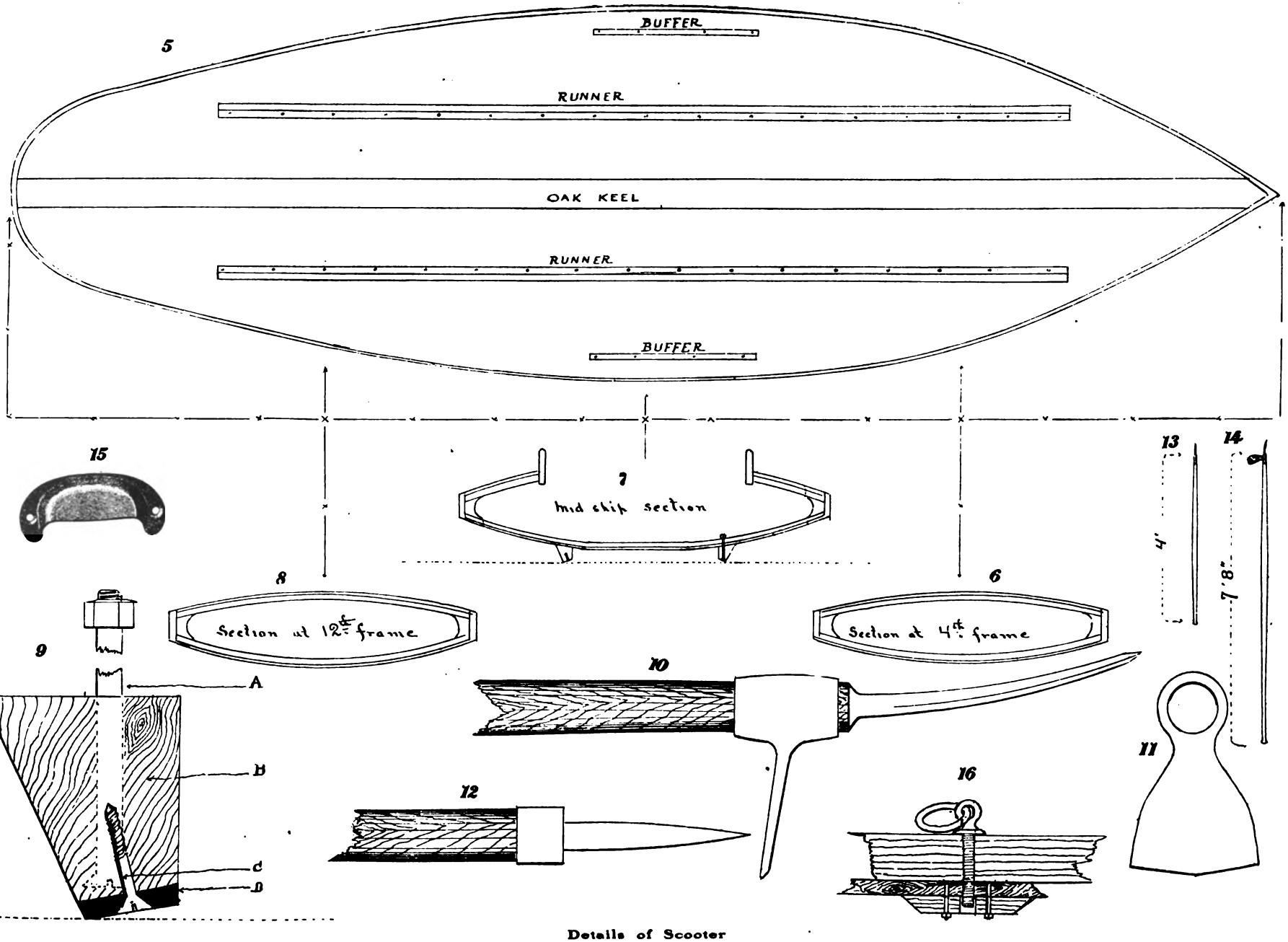

Details of Scooter

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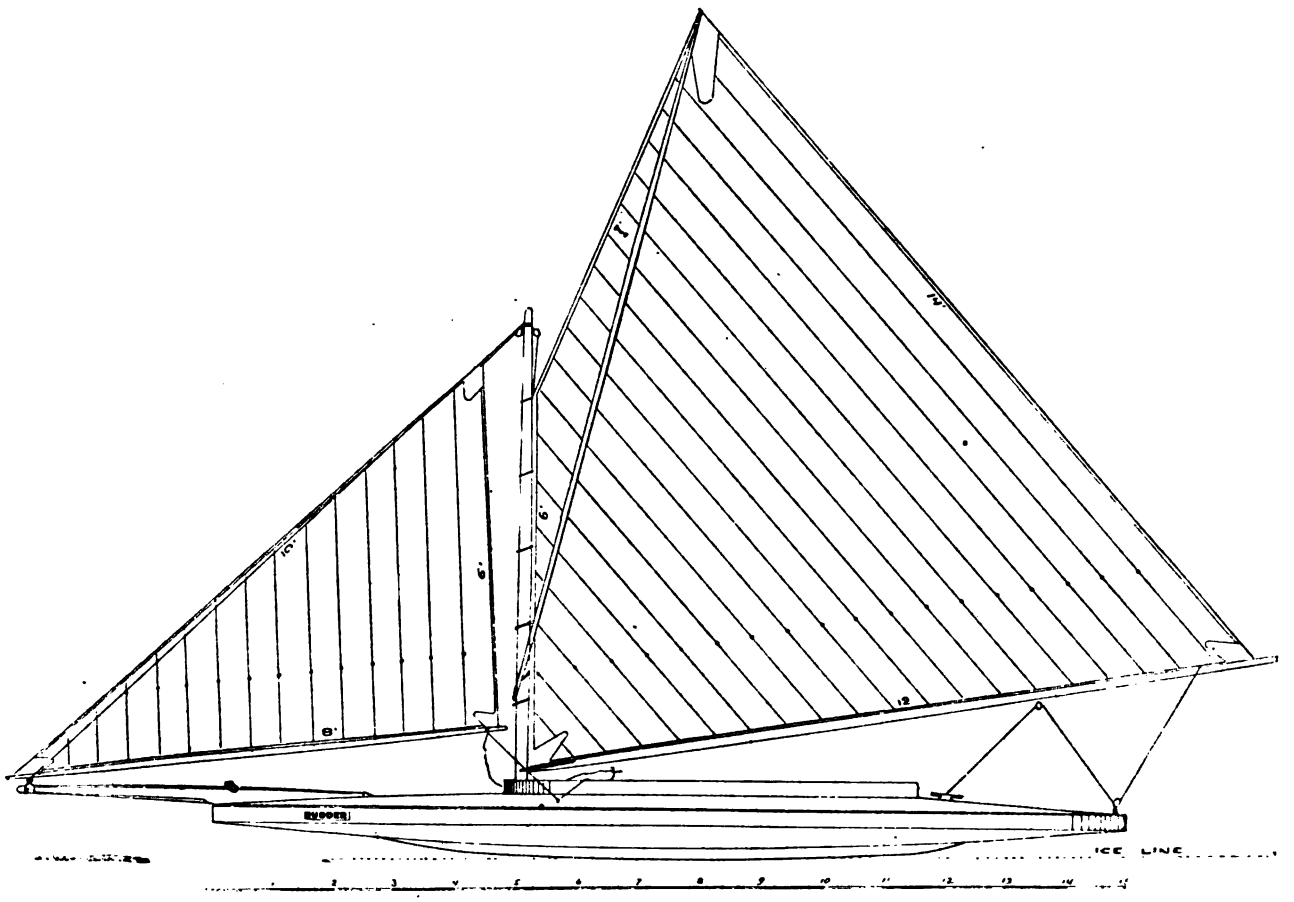

Sail Plan of Scooter

3 inches. Sail area—main 121.25; jib 37.50; total 158.75 square feet.

Rigging—The standing rigging of racing ris is ¼-in. diameter steel. The stay and shrouds are looped over the mast, a thimble spliced at lower extremity and set up with lanyards. The smaller rig's standing rigging is of Russian hemp 7-16 of an inch diameter and set up the same way. The blocks are No. 1 bronze, or a good serviceable galvanized iron block.

Runners—Of oak, and are 10 feet long by 2 inches high, and 1¾ inches wide at boat, tapering on outside to 1 inch. They are bolted to hull with 9-32-in- screw-head iron bolts, which pass through every other timber. The brass shoes are 1 in. wide and ¼-in. thick; they are fastened by 1¼-inch brass screws, spaced 7 inches apart, set flush, with all slots in heads running fore and aft. The tilt grade of cutting bevel of shoe is about 12 degrees. From inside to inside of runners is exactly 22 inches.

Pike-Poles—Are two in number, the shorter one, plate 4, No. 12, is 4 feet long by 2 inches diameter; the longer or hoe pole is 7 feet 8 inches by 2 inches—in circumference the former carries only a pike, but the latter as well has a pike that is bent in opposite to the hoe. The hoe is 4 by 4 inches. Can be made in the shape as shown in cuts 10 and 11, or be in spade shape.

Bowsprit—Of spruce. Fastening is shown in cut 16. A ¼-inch plate is bolted with an oak block underneath the king plank. A ring bolt passes through the bowsprit and then through the plate and king plank and block. The ring bolt has a thread its whole length, so that when bowsprit is removed it can be screwed flush with the king plank, and used to fasten the painter to. The heel of the bowsprit fits into an ordinary heavy brass draw-pull. See cut No. 15.

Oars, etc.—One pair of heavy 8-foot ash oars. They are secured by a block bolted to deck in which is inserted an oarlock. Always carry the oars in the boat. A wooden or canvas hatch is made to cover the cockpit. The runners are beveled inward with brass shoes, and the oak straight-edges face each other as shod.

KEY TO SCOOTER—PLATES 3 AND 4.

No. 1. Side view of hull.
" 2. Showing timbers, etc.
" 2. Showing deck, deck beams, etc.
" 4. Deck with grating in cockpit.
" 5. Bottom and runners.
" 6. Section at 4th frame.
" 7. Midship section and runners.
" 8. Section at 12th frame.
" 9. Details of runners.
" 10. Side view of hoe pike.
" 12. Steering pike.
" 13. Steering pike showing full length.
" 14. Hoe pike showing full length.
" 15. Draw-pull screwed on deck for heel of bowsprit.
" 16. Mode of fastening bowsprit just aft of stem.
Fig. 9. A. 9-16-inch iron screw-head bolt.
" " B. Oak runners.
" " C. Screw fastening brass.
" " D. Brass screw.

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HURRAH'S NEST

"A Place for everything and nothing in its place." Letters for insertion under this head are limited to two hundred and fifty words, and must be accompanied by correct name and address of writer. Address the Hurrah's Nest, care Editor THE RUDDER, 1 Hudson St., N. Y., U. S. A.

NOVEL STERN-WHEELER

You will doubtless remember me as one of the crew of the Woodpile, Unome First, Hopalong and Alsoran. Enclosed picture, however, represents a different type of boat from any of those referred to. I thought perhaps you would like to publish the picture, also giving the readers of THE RUDDER the story of this novel craft.

Her name is The Merry Widow, being owned and designed by Captain James P. Armbrust, a retired granite manufacturer of Vinalhaven, Me., who built the entire craft himself, with the exception of the engine and counter shaft, in 1907. The Merry Widow is used in a shallow salt-water pond which is filled with eel grass and where a propeller boat could not possibly be used. Her dimensions are 20 ft. over all, 17 ft. 4 in. water line, 4 ft. 2 in. beam and 4 in. draught. The engine is a 3½-h.p., 2-stroke Universal, built by the Universal Mfg. Co., West Mystic, Conn., having a Schebler carbureter with Perfex jump-spark ignition. The engine turns 600 r.p.m., being belted from a small pulley on end of crank-shaft to a counter-shaft provided with an ordinary friction clutch. The paddle-wheel is 3 ft. in diameter, being driven by sprocket and chain from the end of the counter-shaft and turning 50 r.p.m. The Merry Widow makes 6 knots over the eel grass and is used as a common carrier between the town of Vinalhaven and Captain Armbrust's 100-acre farm on Day's Point, the trip by water being one-half a mile, but nearly two miles by a road, which is not any too smooth.

Although not shown on the picture, the boat is provided with a large yellow sun umbrella, the handle of which is stepped on warm and rainy days, just forward of the engine.

Although the Captain is a deep-sea sailor, and has handled the wheel of one of our clipper ships in days gone by, it may be readily seen that he has appreciated the value of the gasoline engine, and has very ingeniously applied its use to meet his particular requirements.

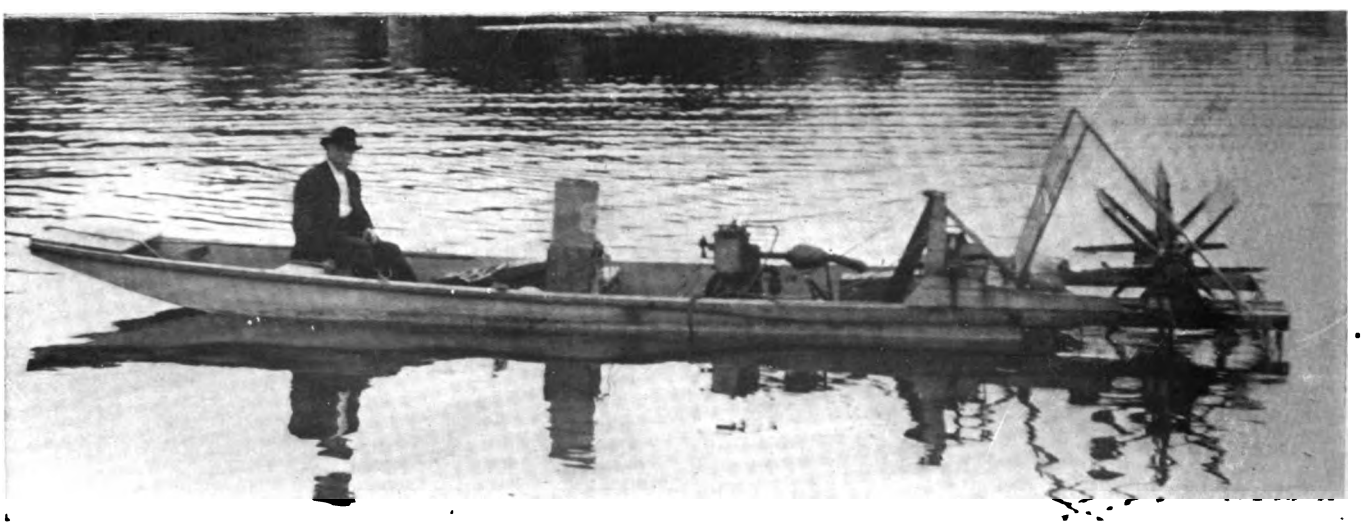
Boston, Mass. GEORGE STETSON.

GOLD CUP RACES

WE beg to advise you that the 1911 races for the American Power Boat Association Challenge Cup will be held over the triangular course of this Club at Frontenac, Thousand Islands, N. Y., on August 8th, 9th and 10th. The course is seven miles in length, with very easy turns, and free from shoals or other obstructions. It lies directly in front of the clubhouse, and the racing boats are always in sight from start to finish.

The cup was won this year by our representative, Dixie II, Mr. Frederick K. Burnham, owner.

As you undoubtedly know, this is an ideal spot for holding the big event, and no effort will be spared by the officers and members to make it successful. In addition to fine hotels, splendid and ample docks, shipyards, boathouses, etc., is the natural beauty of the region. The water is remarkably pure and free from all kinds of drift. The scenery is world-famous, and a more delightful spot for power-boating or cruising cannot be found than the Thousand Islands.



Merry Widow. A Novel Stern-Wheeler Owned by Capt. James P. Armbrust of Vinalhaven, Me.

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The N. Y. C. Railroad Company have provided cranes at Clayton, N. Y., their Thousand Island terminal, so that racing boats may be unloaded direct from the cars into the water. With the excellent facilities at hand we hope to secure a large entry list, especially from clubs whose homes are not on the river.

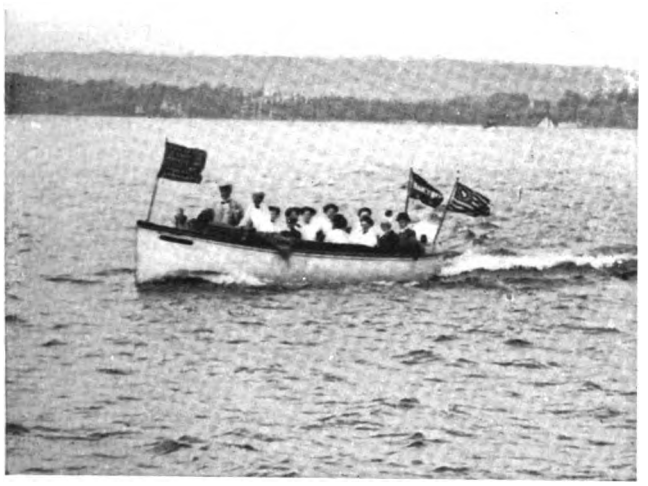
If you will kindly inform your readers of these facts through the columns of your valuable publication, it will be appreciated.

FRONTENAC YACHT CLUB,
Robt. J. Reddy, Secretary.

VIPER

OUR Viper is a great success. She is very lightly but strongly built, and we installed an 11-h.p. two-cylinder, two-stroke engine in her, which we run at 1050 r.p.m., and which drives a three-blade 16x20-inch wheel, giving us a speed of better than 16.5 miles per hour. With a two-blade 16x21-inch wheel we got 16.2 miles per hour.

Greenport, N. Y. C. PLINY BRIGHAM.



Atlantic Dory on Lake Chatauqua, N. Y.

DORY ON INLAND WATERS

THE above photo is of one of the Atlantic Company's 30-ft. semi-speed clipper launches, equipped with Atlantic Special 15-18-h.p. engine. The boat is used on Lake Chautauqua, and is owned by Mark Packard, of Buffalo, N. Y. The craft was designed to carry a large party, as may be seen from the photo, with seats around the sides of the cockpit, engine installed in the forward cockpit, where there are side seats, control of the engine through reverse gear, and the forward control handles.

Although of the regulation coast type the craft has given excellent satisfaction, and should prove a comfortable and safe craft on any inland body of water, particularly localities subject to sudden squalls and rough water.

DURHAM BOATS

BEFORE the advent of canals and railroads the traffic between Philadelphia and the upper Delaware was carried by a boat of peculiar build, known as the Durham Boat.

Local tradition has it that this boat was first made, on the river, in the township of Durham, County of Bucks, Pa., by one Robert Durham. There are some reasons to think that the tradition is not altogether correct or, at least, that it needs confirmation. The statement, however, has gone into several histories, and seems to be pretty generally accepted.

A boat of the same character and known by the same name was in use on the rivers of New York State and of Canada. There is some confusion of dates in the matter, so that it is so far a little difficult to determine the priority, although on the Mohawk it is conceded to the Delaware.

While the question of priority is of interest, the question of whether either locality is entitled to the credit of devising the boat is of greater interest. It is possible that Durham came from England bringing with him the design of the boat from some place suitable for such craft. This latter point I am seeking to ascertain from some correspondents across the water.

It is quite possible that the matter has been all looked up by somebody else, and that a search of the libraries would disclose all I wish to know about it, but thus far I have not been able to learn that such is the fact.

A point of interest is the fact that it is stated that these boats were used by Washington in the historic Crossing at McConkey's.

The boat was long and narrow; propelled usually by poles; calculated only for quiet waters; pointed at both ends; rigged with a removable mast and sail for use in fair wind when going up stream.

I am anxious to learn whether there is any history bearing on the origin of the craft and its use elsewhere, as well as on the Delaware.

In accounts of the movement of troops on tide water, in 1776, much mention is made of gondolas and gondolamen. Do you know what kind of craft these were? From the fact that gondolas, as now known, are sharp bow and stern, as the Durham boat was, I am led to think that perhaps the latter was spoken of by the term gondola.

If you can give me any light on the subject I shall be greatly obliged.

Lambertville, N. J. YACHTSMAN.

[The Editor will be obliged to any reader who can give the inquirer information regarding these boats.]

STERNWHEELER

HAVING left the seaboard for the interior for a couple of years, I enjoy THE RUDDER that much, as it brings to me a little sea breeze in the mountains. While greatly interested in such designs as Viper, how about the boat fiends that live on shallow waters, and are craving for a spin up the swift Columbia or its many affluents? Here we have thousands of miles of beautiful water that could be navigated if one had a shallow speed boat, something that could travel about 14 miles per hour, with a draught of not more than a foot. Is it possible to take a model such as Viper or the old Dolphin and have a stern wheel that would give it a good speed? I wrote to several engine firms regarding the matter but failed to get any satisfaction. I know hundreds of fellows in the Columbia Basin would welcome such a design, and many engines would be sold there if the proper boat and outfit could be furnished.

Tonasket, Wash. E. H. TWIGHT.

[We have something of this nature on the fire now.—Ed.]

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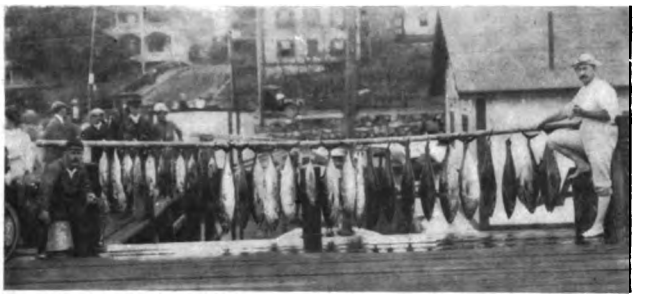


Albicore and Bonito Caught from Power Boat Spray Off Block Island

A FISH STORY

OFF Watch Hill about fifteen miles, halfway between Block Island and Montauk Point, I recently had the most wonderful fishing it has yet been my experience to encounter.

Enclosed is a photograph of eighteen Albicore, weighing 25 to 28 pounds apiece, and twelve Bonita, weighing about 3½ pounds apiece, taken one morning in the first week in September. These fish were caught in exactly the same way as the bluefish, i. e., trolling, with my power boat Spray, with regular bluefish gear, except for heavier line and heavier hook. Is such fishing as this common to the coast as far up as Watch Hill?

Detroit, Mich. HENRY B. JOY.

LURLINE

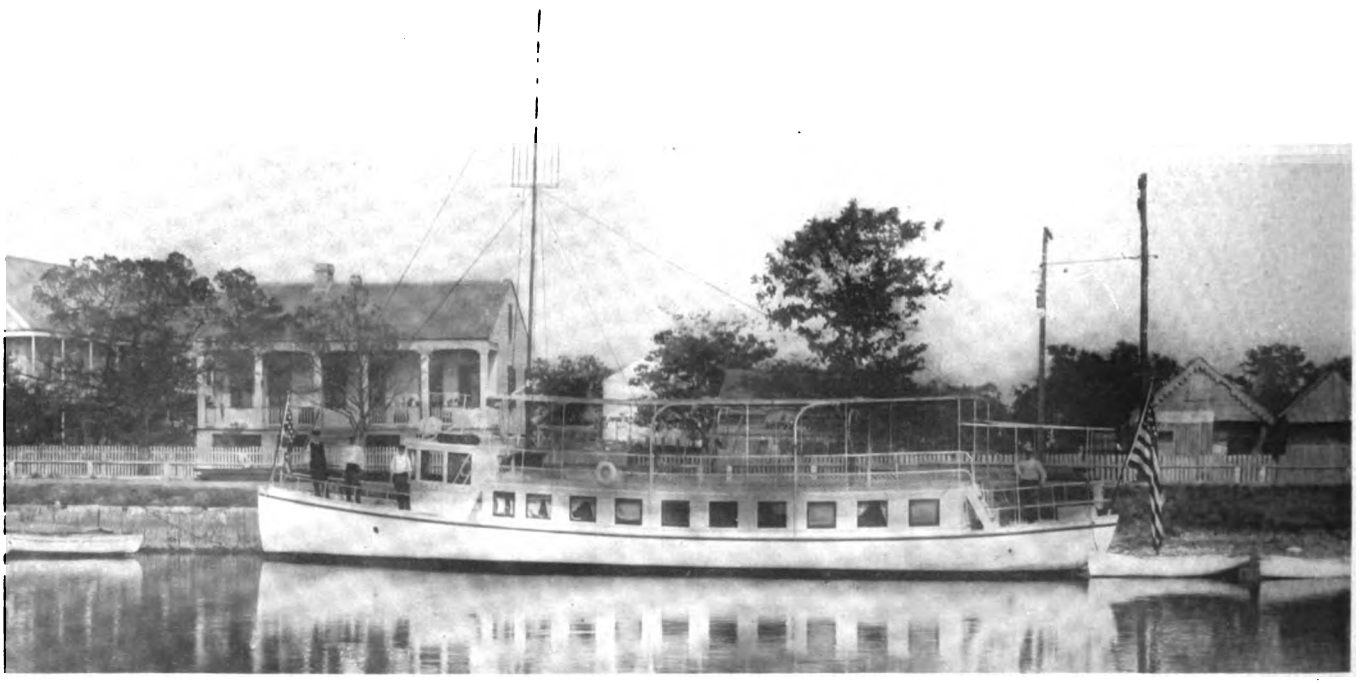
LURLINE is owned by Mr. P. J. McMahon of New Orleans, La., and is interesting in that she is equipped with a complete wireless outfit. The craft is 72 ft. over all, 15 ft. breadth, and draws 4 ft. 6 in. of water. She is fitted with three-cylinder, air-starting Globe engine, bore and stroke 10x10 in. which drives her 11 miles per hour.

RULING BY THE STEAMBOAT INSPECTION SERVICE

THE question of whether persons holding license as pilot may act under such license as master of motor boats without having a license as operator of motor boats, having been brought to the attention of this office, and particular reference having been made to the third paragraph of page two of the circular of rulings of this office under date of September 1, 1910, in which paragraph this Bureau refers to a letter written under date of August 29, 1910, to the Supervising Inspector of the Second District, relative to this same matter, in which letter the office stated "that the law requires that no motor boat, while carrying passengers for hire, shall be operated or navigated except in charge of a person duly licensed for such service by the local board of inspectors," it may be stated that this Bureau holds that persons holding license as pilot may act as master of a motor boat without having an operator's license.

WEIGHING CARGO

AN ingenious new invention for weighing a ship's cargo is that known as the porhydrometer. It was devised by Signor Emilio de Dorenzi, an Italian engineer, and the results it records are said to be accurate within .001 per cent. It works on the well-known Archimedian principle that a floating body displaces its own weight of water. The apparatus consists of a float or aerometer, cylindrical in form; this is placed in a chamber of the vessel which communicates with the water outside. As the ship is loaded and sinks, so the water rises in the chamber. The float being fixed, a larger portion becomes immersed in the water, and its apparent weight lessened. By a simple arrangement of levers this apparent loss of weight of the float is registered, and the weight of the cargo is thus indicated.—*T. P.'s Weekly.*



Lurline Globe Engine. Owned by P. J. McMahon of New Orleans, La Note the Wireless Telegraph Outfit

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The Elbridge Compan's Flyer

CAN BEAT THE VIPER

We have something that is much more fun and much faster than Viper, though built very much on the Viper lines. It is a little flat-bottomed boat, 12 ft. long, 4 ft. of beam. We first put a 4-cylinder, 40-h.p. engine in it, and it ran like the proverbial scared cat, but we could not steer it. We put in a 3-cylinder engine, and the things it does to our Viper, fitted with a 4-cylinder engine, are enough to break the heart of the designer of Viper. With 25% less power, the 12-ft. boat is at least 25% faster. We think Viper is a nice, substantial, and an economical little boat, but we agree with your man in Michigan that her most economical speed can be secured with 10-15-h.p. We have tried all kinds of propellers and two or three different engines in our Viper, and apparently do not get a difference of more than a mile an hour in speed. In other words, around 22 miles an hour seems to be her natural limit.

ELDRIDGE ENGINE COMPANY.

VIPER A REMARKABEE BOAT

"THE celebrated speed motor boat Viper, designed by Mr. Albert Hickman and Mr. Sanford Munsie of Pictou, Nova Scotia, was placed on exhibition at the St. John, N. B., exhibition during the latter part of September. This is a wonderful little craft. Aside from the fact that she is finely built of cypress fastened with brass screws, she appears to be nothing but a simple flat-bottomed boat, simpler even than a dory, but this little flat-bottomed boat in the past six months has been revolutionizing the ideas of naval architects in the designing of small speed boats. At present it is acknowledged that, for the power and weight, the Viper type, as it is called, stands as the fastest type of power boat hull in the world. And not only are these boats extremely fast, but they are safe and seaworthy, and in all respects the most comfortable of all the speed boats. Mr. Hickman, Mr. Munsie and Mr. W. C. Wetmore experimented with Viper for two years and a half, and into the same twenty-foot hull they put various engines of from 3 to 30-horse-power, getting speeds of from 8 to 26 miles an hour. In March of this year, Mr. Hickman published the first article descriptive of Viper in THE RUDDER, followed by two other articles in the April number, and immediately following, in the May number, Mr. Seth G. Malby, of Cornell, made a violent attack on him and his conclusions in regard to the boat. Commenting on Mr. Malby's article editorially, Mr. Thomas Fleming Day, the editor of THE RUDDER, and one of the leading yachting authorities in the United States, said: 'The trouble is Mr. Hickman has committed one of the most terrible offences known to the code—he has knocked on the head and badly damaged a number of elaborate scientific theories. In plain English, he has exploded a bomb under a pile of pet ideas evolved by impractical persons.'

"From here the Viper fight started and it has brought in, one way or the other, many of the leading naval architects. Now, however, it is pretty generally accepted that Mr. Hickman's contentions are correct. The boats are being built in large numbers throughout the United States, and already there are Vipers running 36 miles an hour.

"Speaking of this boat, Mr. Hickman said: The advantages of this type of boat are many. First, you get high speed with less power than with any other model. Second, the boat is perfectly safe and cannot be overturned. Third, she is dry and comfortable at high speed, and the higher the speed the drier she is, and fourth, and not least, she is the cheapest possible type of boat to build. There is not a piece of bent work in her. Technically, she has all the advantages of the hydroplane and the displacement boat, without necessitating the light weight of the hydroplane.
hydroplane.

"The boat I brought to St. John is a low-powered Viper, carrying only 17 horse-power, but when she is tuned up she should do about 20 miles an hour.

* * *

"The motor boat race for the L. M. Trask Company's trophy at Millidgeville, Saturday, September 24, was won by H. J. Hickman's boat, Viper III, in the remarkable fast time of 30 minutes and 51 seconds. The course was a ten-mile one. The day was an excellent one for the race, and all the wharves and the clubhouse veranda were crowded with interested spectators. The water in front of the clubhouse was black with motor boats and other sailing craft, and on several occasions it was difficult for the judges to clear the course. Crowds went out from St. John in busses, carriages and automobiles.

"Nine boats started in the race and all but three finished. The first boat was sent away at 3.30 p. m. and the next was about five minutes later. The last boat to get away was Effie M., which did not leave Millidgeville until 3.54 p. m. Viper, which won the

Elbridge Craft at Full Speed

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race, left the starting point at 347.58 p. m., and finished at 4.18.49. Essex, which won the cup in the last race, finished in second place, nearly five minutes after Viper.

"The following is a table of the race, giving the starting time, the finishing time and the time taken to cover the course of each boat in the order in which they finished.

TRASK TROPHY RACE

SEPTEMBER 24TH, 1910

Course 10 miles, start on allowance.

	Start	Finished	Time Elapsed
Viper III	3.47.58	4.18.49	30.51
Essex	3.48.04	4.23.23	35.19
Keeonik	3.38.10	4.24.52	46.42
Effie M	3.54.09	4.27.07	32.58
Bonsel	3.30.00	4.28.33	58.33
Phoenix	3.45.01	4.35.12	50.12

"Curlew, Grayling and Arrow did not finish. The judges were F. A. Dykeman, F. J. Fleming and C. Colwell. Percy Howard and W. C. Rothwell acted as starters.

"Viper III is a strong, seaworthy little boat. Her length is 20 feet and her engine by the rule is rated at 17-horse-power."

SPEED PROPELLER WHEELS

HAVE read with interest the explanatory article on speed propeller wheels by Harry J. Perkins, N. A., in the July number of THE RUDDER, and would like to offer an opinion more especially applicable to speed wheels and additional reasons for vibration.

A propeller with a radical shaped blade is not suited for speed, as the blade requires to be thicker to get sufficient strength, being harder to rotate, especially near the dead-wood where it strikes the dead-water, for the length of the blade causing vibration. One with an elliptical blade is better, but one with a slanting blade is best, the entrance being nearer the hub, the tip of the blade being further away from the dead-wood giving an easier entrance, as for example the "Thornycroft" used on torpedo boats.

But in the slanting blade there is more overhanging weight, the entire weight of propeller coming on the end of the shaft beyond or outside of the stern bearing, putting the shaft under strain. The lower half of propeller working in denser water than the upper half nearer the surface exerts more thrust, consequently the strain on the shaft is continually changing around the shaft as it rotates and tends to weaken it, and it does not take much of a blow on a partly submerged object in the water to bend the shaft; at the same time the wear on the lower side of the stern bearing, especially on the back or outer end, is greatly increased, more than it would be by the weight of the propeller alone. But by enlarging the hub and extending a rim (or bell, as Mr. Perkins calls it), as in Fullerton's patent, 794932, over and enclosing the bearing, and also extending the blades forward to the front edge of the hub extension, if carried forward far enough in advance the overhang weight can be entirely eliminated or balanced if so desired, there is obtained a strong thin blade with little displacement of the water, and one less liable to be injured by striking a partly submerged object.

But in practice it is not necessary to eliminate all the overhang weight of propeller. The outer diameter or shell can be made thin with the blades cast to it, or they may be attached separately to the shell, and also exend a fair-water at the back of the hub out to a point and lighter than the water it displaces. The stern next the propeller is fitted flush with the rim, but allowing the propeller to rotate without touching.

As for the shaft log "being as small as possible," as Mr. Perkins says, there is no need of it, for the reason that the inner third of the diameter of the ordinary screw propeller does no useful work or thrust in the direction of the keel until the part of the blade comes to an angle of about 45° with same.

J. D. FULLERTON.

Auxiliary Cruiser Sagitta. 50 Ft. O. A. Murray & Tregurtha Engine. Designed by T. D. Wells and Built by Alex Macdonald for Harry C. Ward, N. Y. Y. C., for Use in Southern Waters

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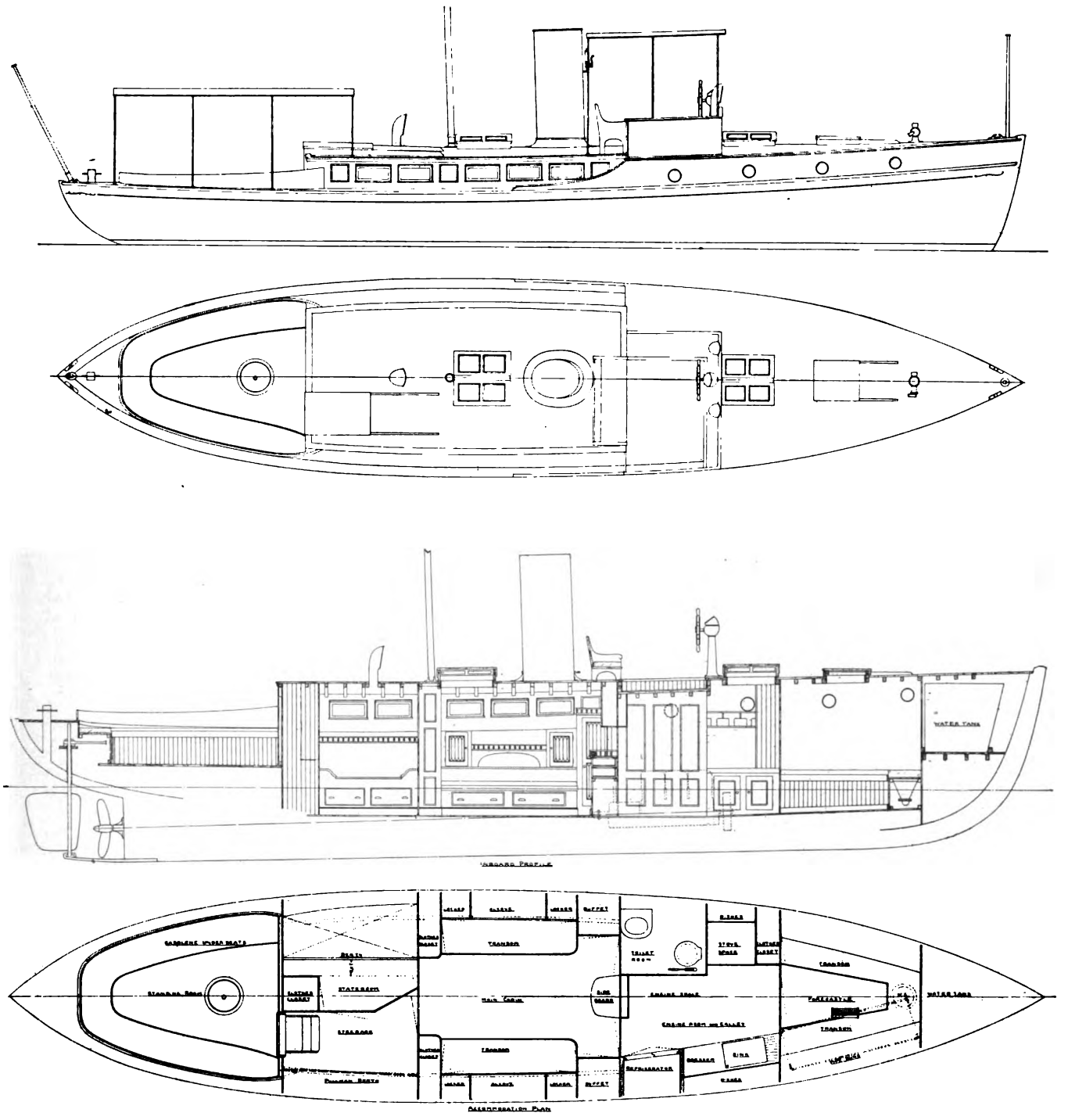

Doris B. II. Designed and Built by Britt Bros., Lynn, Mass.

DORIS B. II

Doris B. II was designed and built by Britt Bros. of Lynn, Mass., for Mr. J. C. Benz, of Lynn, Mass., the requirements being a fast cruiser but one in which speed was not wholly sacrificed for sea-going qualities. The builders state that the boat has proven very successful, and one of the firm writes of the craft as follows:

"I have but just returned from a cruise with him from Bar Harbor, Maine, on which the boat logged 10½ knots for the entire trip. We had some very rough weather on the trip, and the boat behaved beautifully. She is quite an expensive boat, being built of the best material and workmanship throughout. The cockpit and trunk are finished in mahogany, also stateroom, steerage, saloon and toilet, which are finished in selected wood. The engine room, galley and forecastle are finished in cypress. The boat is equipped with six-cylinder, 45-65-h.p. Sterling engine, and has actually logged over 11 knots an hour. The boat is handled from the bridge, having spark and throttle control and reverse lever all on the bridge. The boat has a power windlass of our own design and build, which is very powerful. One man can get a 100-lb. anchor with ease, as it works to perfection.

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EIGHTY-TWO-FT. OCEAN CRUISER

THE eighty-two-footer shown in the accompanying drawings was designed by John Trumpy of the Mathis Yacht Building Co. of Camden, N. J., and is now under construction by the firm for Mr. J. Frederick Betz, of Philadelphia, Pa. The contract requires the craft to be completed and delivered by March 1st, 1911. The builder states that the boat will very probably be a contestant in the next Philadelphia-Habana long-distance race, and if such proves to be the case, the craft, with ample time for tuning up, should make a strong showing.

The construction throughout is to be of white oak, the frames being steam-bent. Planking to be yellow pine, decks white pine, and all deck joiner work to be of mahogany.

The boat is to be of the flush-deck type, with trunk cabin over aft quarters and low house over dining saloon forward. This house top is of white pine, and to be used as a bridge. Boat to be schooner-rigged, with enough sail area to give her steerageway in case of breakdown in machinery. She is also fitted with two stacks; one answers the purpose of ventilating and smoke pipe of the galley and the other is located directly over the engine room and ventilates the engine room, and also used for exhaust from the engine. One 12-ft. dingy and one 16 ft. speed power boat will be swung on substantial davits, and stoved on top of aft trunk cabin, allowing free passageway at all times.

Starting below deck aft, a large double stateroom with necessary closets next to same, with passageway leading into bathroom on port side and small stateroom on starboard side. This passageway leads direct into the center of the owner's stateroom, which is large enough to accommodate a large double brass bed, extension seat and necessary furniture. These rooms are all lighted and ventilated from the trunk cabin.

The engine room is divided from the rest of the boat by water-tight bulkheads, and the gasoline tanks are located in special compartments forward of the engine room. Extension seat is located in engine room for use of the engineer. The engine to be installed will be about 100-h.p. at normal revolutions, which will give her a cruising speed of about 15 miles. The boat is lighted throughout with electricity, the auxiliary engine and generator being located on the starboard side, the storage battery being located on the port side in special ventilated lockers. Ample space is allowed in the engine room, to be able to get all around the engine with ease, and at the same time keeping her properly ventilated.

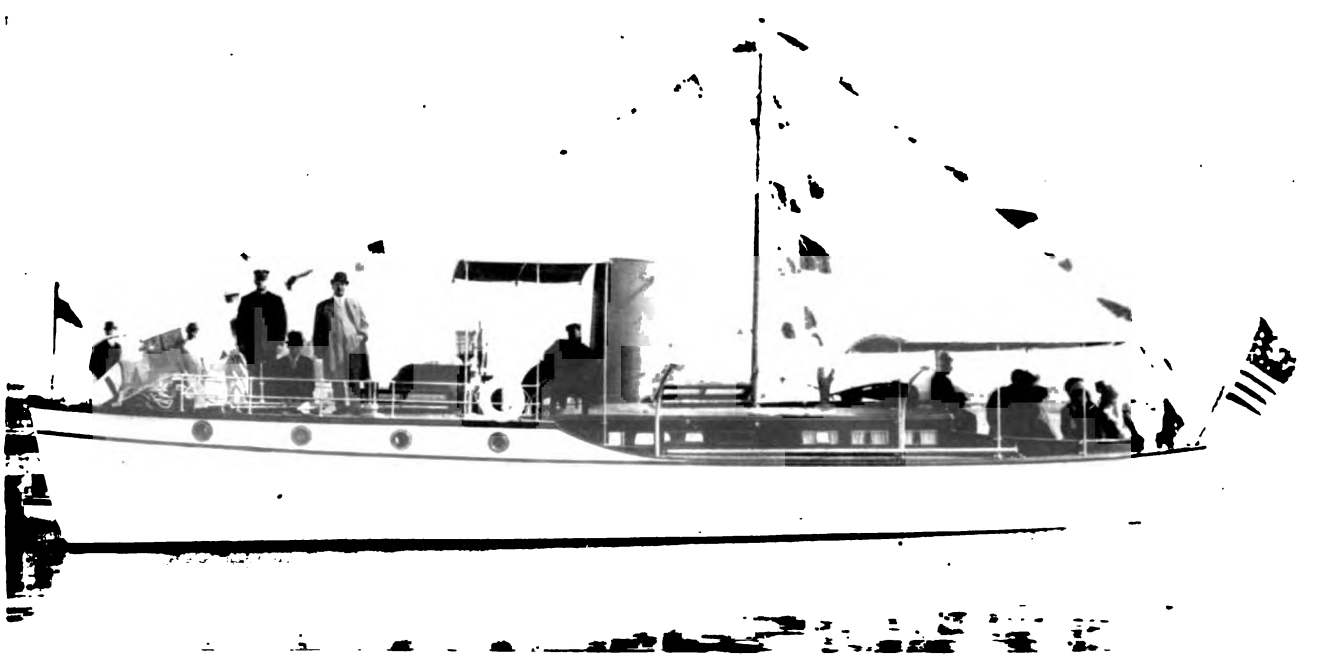
The galley is located forward of engine room, and is entirely separated by a water-tight bulkhead, and is ventilated by stack. A door from this room is arranged under the dining room, which space is to be used for storage and fresh-water tanks. A horizontal dumb-waiter is arranged under the floor of the saloon, which allows the forward crew quarters to be used for mess room, which is rather a novel feature on this type of boat, and saves carrying the food up over deck and down forward hatch, which is common on boats of this type.

The dining room is located forward, and finished throughout in African mahogany. Windows are arranged to be of the Pullman type, and allow the lower half to lift up, the upper half being arranged with plate-glass, which allows a clear view without being obstructed by screens; at the same time this does away with the pockets, which are always an inconvenience and a rotting place, and at the same time allows the outboard side of the dining saloon to be used for lockers, or same could be used as a Pullman berth. Air ports are fitted in the forward side, to insure seaworthiness.

Sleeping quarters are arranged forward for four crew, allowing this boat to accommodate a crew of six men. The crew toilet is located forward. The chain locker is provided for in forward peak.

General dimensions are as follows:

Length o. a.	82	feet	0	inches
Length w. l.	75	"	6	"
Breadth	13	"	6	"
Draught	4	"	3	"



Doris B. II. 45-65 Sterling Engine. Owned by J. C. Benz, Lynn, Mass. Lines on Page 319

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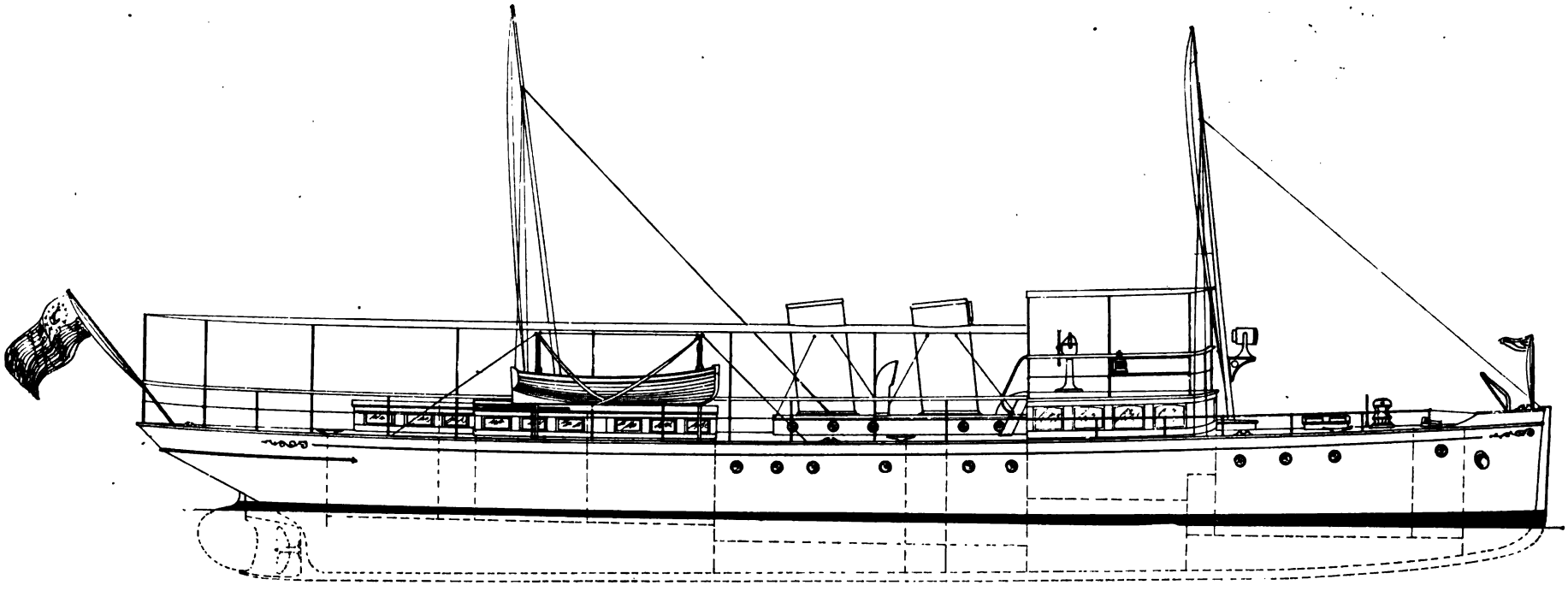

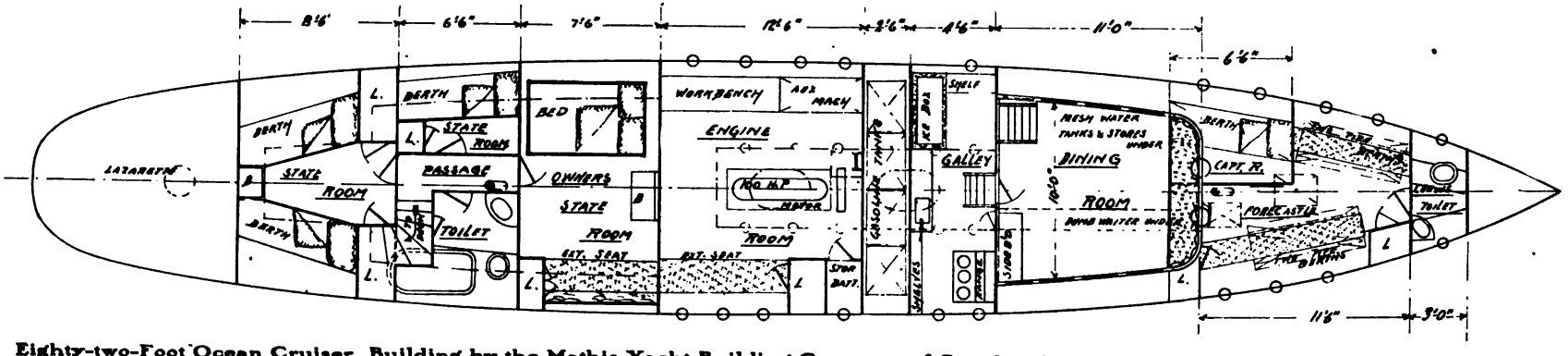

Eighty-two-Foot Ocean Cruiser, Building by the Mathis Yacht Building Company of Camden, N. J., for J. Frederick Betz of Philadelphia, Pa.

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POWER WHALEBOAT

THE accompanying drawings show a very interesting type of boat, two of which were built by George Lawley & Son Corporation, of South Boston, Mass., for Mr. Paul J. Rainey, in his recent trip to the Arctic Circle. Their bows are sheathed with copper as a protection from ice. Planking is 7/8-inch yellow pine, and the power is a two-cylinder 8-h.p. Standard. The boats are fast off the wind under sail, but of course are not very smart to windward, owing to their light draught. The turtleback forward affords good sleeping accommodation for one man. They have water-tight compartments fore and aft.

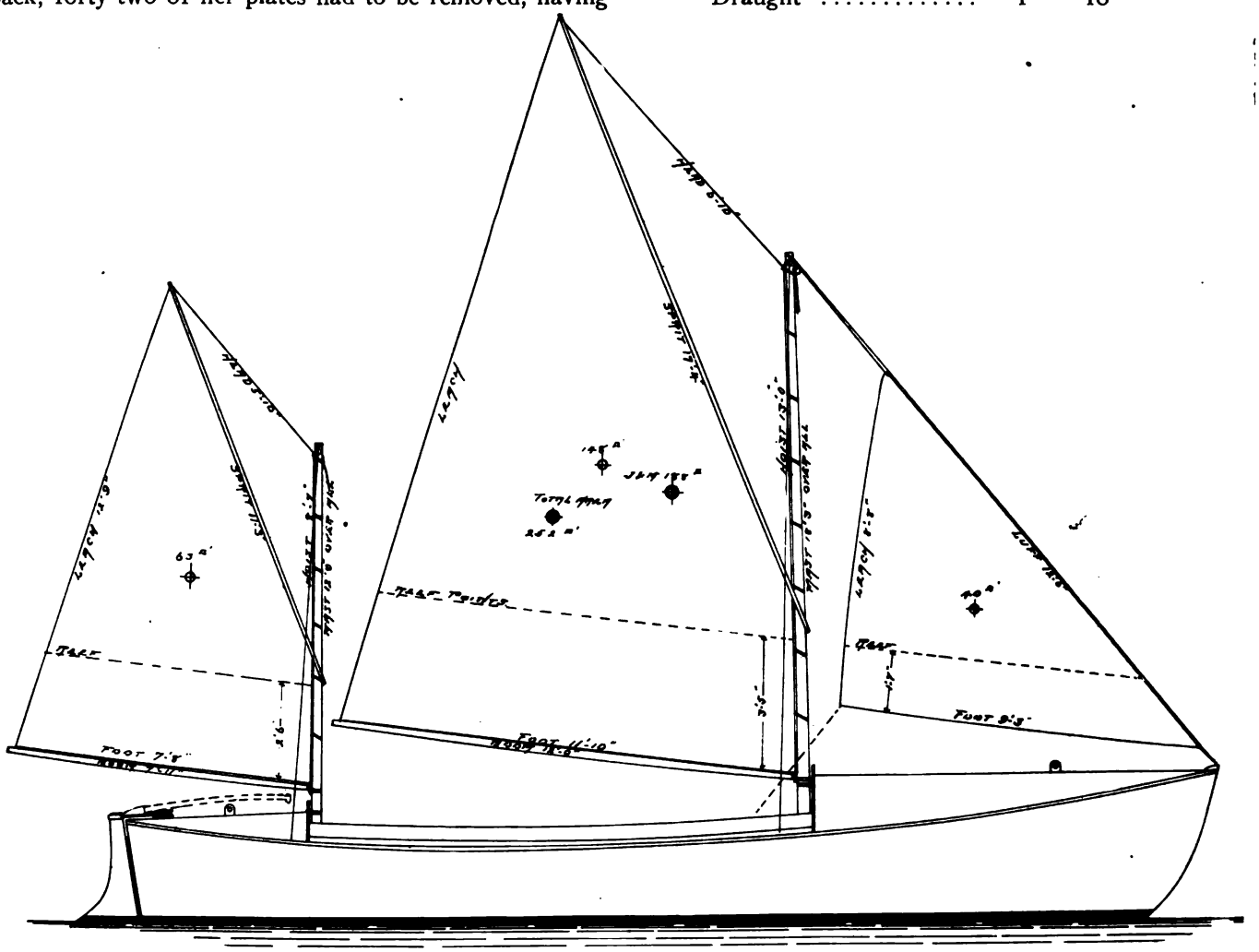
The launches were designed primarily for hunting; with a view also to possible use as lifeboats, and are well able to make a voyage of many hundreds of miles in the open.

These boats were gored by walruses and chewed by polar bears, not to speak of ice and heavy gales, and one of them got all mixed up with a big fish trap somewhere near the scene of activity of the late lamented Dr. Cook. In spite of all this, Mr. Rainey reports that both boats and engines gave perfect service—which is highly creditable to all concerned in their construction, in view of the severe conditions which they encountered.

Incidentally it may be mentioned that the sealing steamer Beothic, which Mr. Rainey chartered for this cruise, has plating of 1¾-inch steel, and when she came back, forty-two of her plates had to be removed, having been dented and sprung by the mighty ice-packs. This is strenuous company for little 28-foot boats, but they made good. General dimensions are:

Length o. a.	.....	28	feet	0 inches
Breadth	.....	7	"	3 "
Draught	.....	1	"	10 "

Bringing Home the Game



Twenty-Eight-Foot Power Whaleboat. Designed for Use in the Far North

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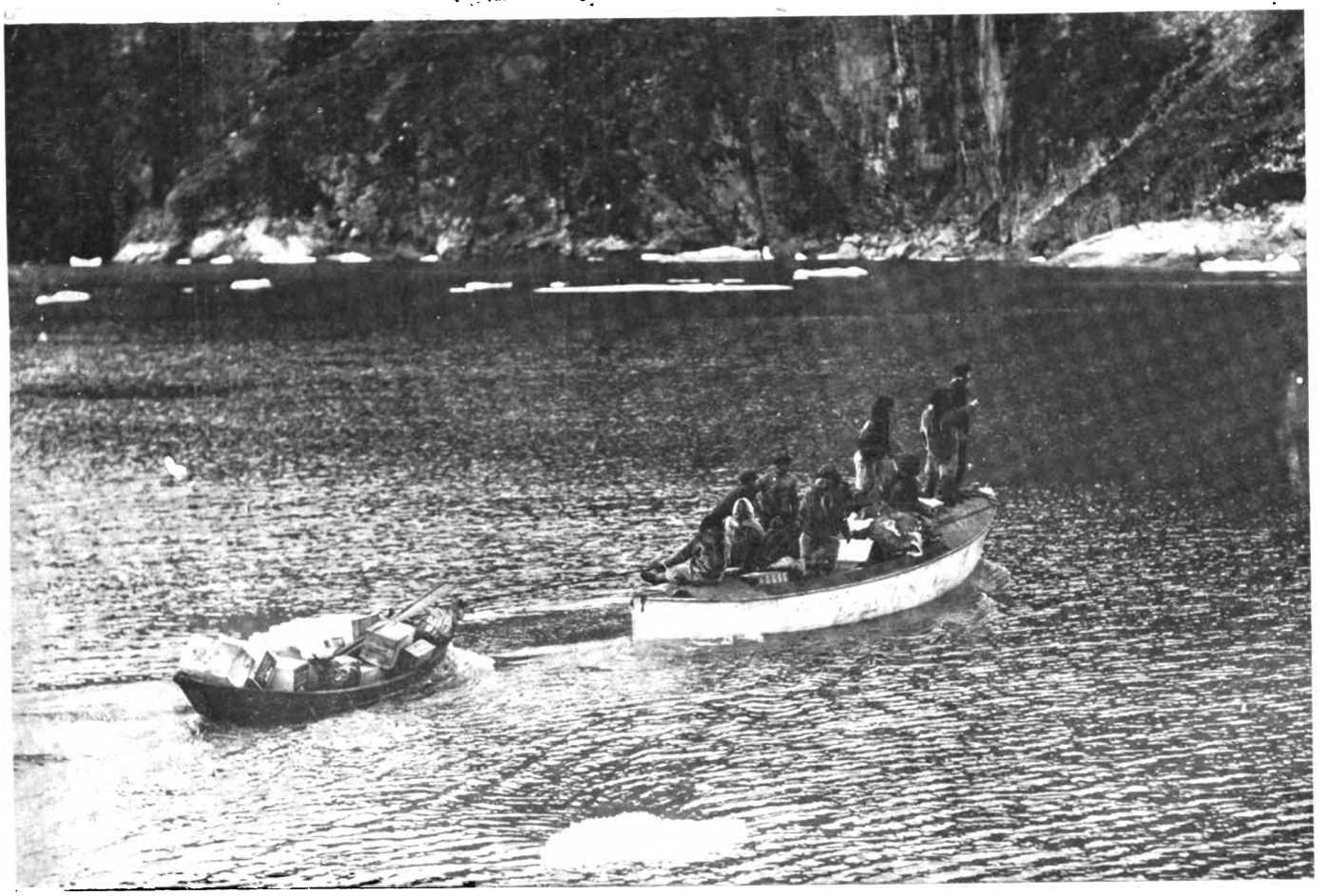

Copyright by Paul J. Rainey

Views of the Power Whaleboat in Action Above the Arctic Circle

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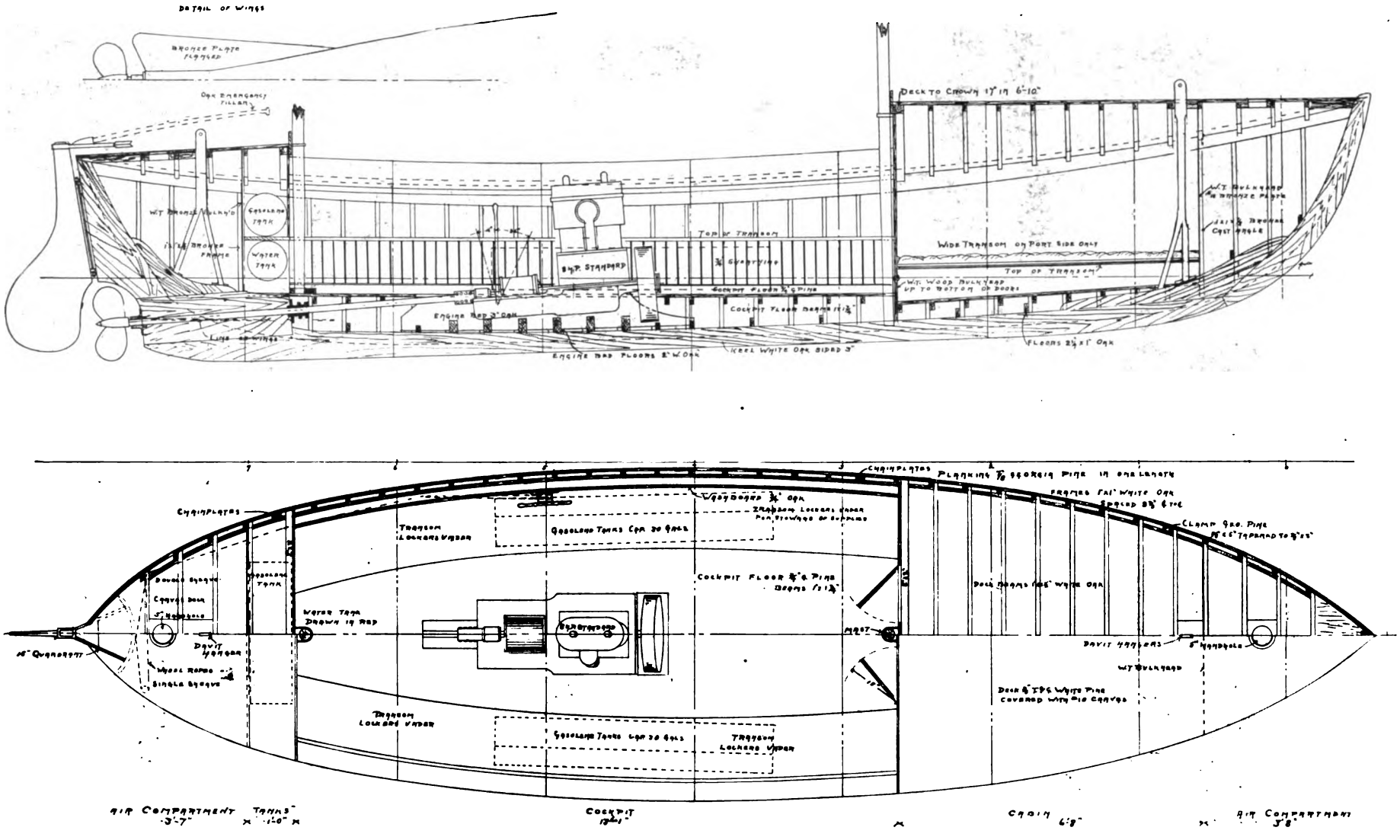

Construction and Arrangement Plans of Twenty-Eight-Foot Power Whaleboat

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POWER CRUISER ETHEL M. WARD

THE seventy-five footer shown in the accompanying illustrations was designed and constructed by the Matthews Boat Company, of Port Clinton, Ohio, for Mr. Chas. Willis Ward, of Queens, L. I. The craft is now on her way to New Orleans, and recently was driven through a 65-mile gale across Saginaw and Thunder Bays, on Lake Huron, out which gale she came without any damage. As she draws but slightly over three feet on an over-all length of seventy-five, this was a considerable test of the strength and sea-going ability of the craft.

In the hull construction, a heavy oak keel is carried out in straight lines from stem to stern, having a least depth of 11 in., fitted with keelsons boxing over keels of frames, and provided with a wearing strip on bottom of keel, which can be easily removed. Planking of 2 in. yellow pine up to waterline, white cedar planking above waterline, tapering to 1¼ in. at sheer. Oak sheerstreak. Frames of white oak, sided 1¾ in., moulded 2 in. at the head, 3 in. at keel, and spaced 12 in. centers. The strength of stringers is given special consideration, as we have found in our past experience that this is the point upon which many builders fall down, resulting in the number of "snaky" sheers, with a hump in the middle, seen on boats. There are five stringers on either side of keel, thoroughly riveted to frames, one being a hogging clamp notching into the stringer at upper turn of bilge. The manner in which the boat was launched shows that this construction is right, as we ran the boat from the shop for a distance of 400 ft. to the water, supported at two points only on the keel, on special trucks which we have on our industrial railway. In moving the boat this distance around the curves there was not a seam opened up in any part of the planking, showing that it could well stand this exceptional strain, a great deal more severe than any it would meet in service.

The exterior finish of cabins and interior finish of deck-house were in select Tobasco mahogany. Decks and interior paneled work of trunk-house of selected cork pine, this material being furnished by Mr. Ward from his tract in Northern Michigan, and which is the last bit of standing material there is of this variety in the United States. We might add, that in the construction of the joiner work the wood selected was so perfect that there was not a bit of sap or knot in any portion of it. We do not believe a boat of any more perfect material has ever been built. The decks were yacht-laid with black seaming composition. The interior of the trunk-house was finished in cream enamel, with mahogany trim.

The boat is ideal for Southern service, as there is 7 ft. headroom throughout the trunk portion of the boat, with good ventilation by means of alternate windows and ports. The entire cabin is covered by an awning made up of Tan-Textol water-proof duck. In addition to the regular ventilation provided by windows, there has been an electric-blower system installed, drawing out the foul air from the after cabins, engine-room, and galley, and discharging it through the stack.

Another matter which was given attention, is the matter of heat produced by the exhaust of the engines, in the boat. To obviate this to the fullest extent, the exhaust was run outside the hull along either side of the keel, the exhaust pipes in the engine-room being water-jacketed to the skin of the hull, run out through special copper castings into heavy copper pipes running on either side of the hull for a distance of about 15 ft. The exhaust is then brought into the hull again, and discharged out through the stern. When the engines are running full load the exhaust pipes where returned to the hull, are perfectly cool to the hand. The water under the boat acts as a cooling medium to the exhaust, and makes a condensation of the exhaust vapors, producing a decreased pressure. The owner would not allow any jacket water to enter the exhaust, and arranged for its discharge at the side of the boat.

The general arrangement provides for crew's space forward, and separated into two rooms, the forward room being for the negro crew of two. Immediately aft of this room is galley, fitted with charcoal broiler, coal stove, and electric fan draft, dumb-waiter to dining-salooon, zinc-lined refrigerator to hold 800 lbs. of ice, dish-racks, and lockers. Galley finished in natural oak. Captain's and engineer's room placed under deck-house, and fitted with large wardrobes, lockers, and lavatory compartment.

The dining-saloon overhead is finished in mahogany throughout, with bevel-plate-glass windows, dropping into pockets when not in service. The room is equipped with a large plainly finished mahogany buffet at after end, and 5-ft. dining-table, dumb-waiter, and an electric Auxetophone manufactured by the Victor people. This phonograph is built with inside connections for deck-house, and large horn running outside of the house for those on deck.

The motive power and gasolene tanks are installed amidship, these compartments being separated from the balance of the boat by steel water-tight bulkheads backed with asbestos and wood, to prevent noise and vibration getting into the owner's quarters. Gasolene tanks are made of heavy rolled copper, and placed in sub-tanks draining outboard. Filling pipes from deck. Shut-off valves on inside of tank. Copper pipe, and every precaution for the safety of installation. Capacity, 600 gals. Motive power consists of two 30-40-h.p. Murray & Tregurtha engines fitted with make-and-break ignition, governors, magnetos, air and water pumps. A special power bilge pump and a hand bilge pump are placed in the motor-room for pumping bilge water from boat, fire protection, and scrubbing down the decks.

An independent electric light plant is installed on the starboard side of engine-room, consisting of a 3-h.p., 2-cylinder, Buffalo engine, connected to generator operating at 110 volts. 9 13 V system is used in connection with this outfit, with storage batteries, in order that each cabin may have light after the main plant is closed down for the night.

The after quarters are given over to the owner, and arranged with owner's stateroom immediately aft of the engine-room, on the starboard side. The stateroom is fitted with a berth 4 ft. 6 in. width, with storage lockers and drawers under.

A speed of 12 miles per hour has been obtained, with the expectation of more speed after the engines have been worked in. The trip to Detroit, Mich., a distance of 65 miles, was made at the average speed of over 11½ miles per hour. Considerable rough weather was encountered, and the craft has proven herself especially seaworthy and steady. The owner and builders have been agreeably surprised at the boat's performance, as it is unusual for a shoal-draught boat of this size to be a thoroughly good-weather boat for deep water.

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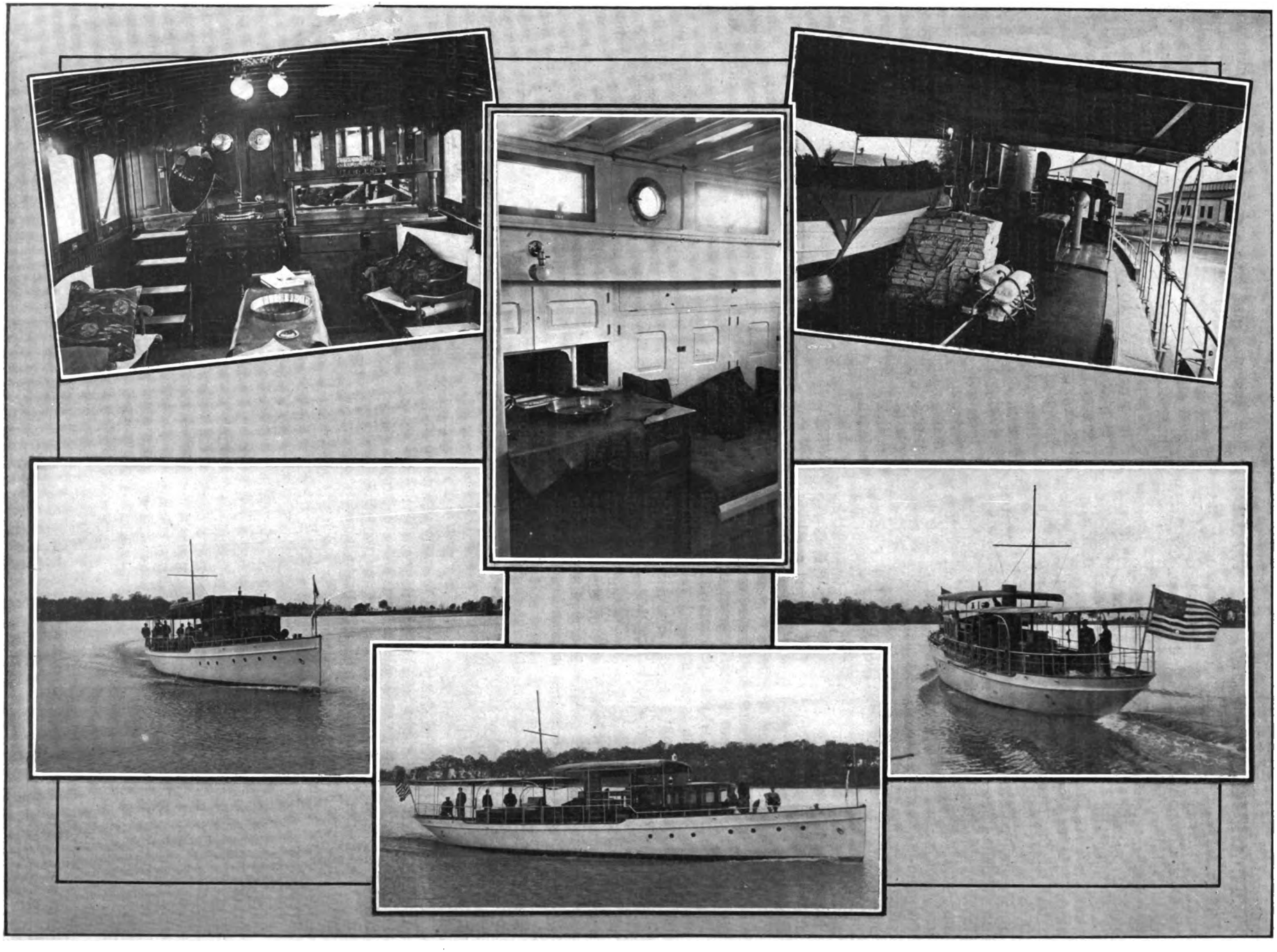

Seventy-Five-Foot Cruiser, Designed and Built by the Matthews Boat Company for Charles Willis Ward, Queens, Long Island

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ROUND THE CLUBHOUSE FIRE

SORRY I had to spring my luff on you boys the last few watches, but it can't be helped. Had everything ready for getting underway—the buoyrope rigged in, head-sheets over, and the cant line set up taut to cast her, but no go; she was stuck bilge deep in a shoal of mail. I've been ever since working like a Finn to free her, and hope she'll come off next tide. This is the first time the Old Man's got so badly neaped, so you'll all forgive him, as he promises to stand double watch next voyage. If some of you are still in want for reply to your letters, don't worry, as the epistle may be at the very bottom of the heap. You can get some idea of what it means to be Skipper of a packet like this, and what his duties are. Last year, during the nine months that my office was open, I answered and wrote over ten thousand letters, on every possible subject that you could squeeze water into. The very word mail has become to me an expression of torture, and I dread the sight of a postman. Nearly all the expense of this terrible correspondence comes out of my own pocket, and as I don't get paid for my work, it would be a small help if those who write and want to be answered would kindly enclose a postage stamp of any color or nationality.

* * *

The winning of the International Trophy Race by Dixie II pleased me, because the success of the American boat was due not to her speed but to her reliability, and that after all is what we are striving to attain. No matter how fast any machine may be it is useless and worthless unless it possesses the quality of lasting out the ordeal. Reliability is the keynote of progress, all else is flourishes. But the necessity of reliability is never realized except through the pressure of experience. In regard to these races it certainly is a good idea of the Motor Boat Club to make it two out of three instead of one race. One race match is invariably disappointing and unsatisfactory, not only to the loser but frequently to the winner, as no sportsman likes to secure a triumph of this kind through a fluke or breakdown. The expense of defending this trophy is heavy, and the club deserves great credit for what it has done to keep the bronze in American waters.

* * *

One of the cheerful signs showing that the sport of yachting is still a live thing is the building of numerous small racing and sail craft. It is the small sail-racer that is the backbone of the sport, and while it lives yachting will live. From far and wide I am getting reports of these boats building singly and in fleets. The famous Bug class will be followed next season on Long Island Sound by forty large Bugs, designed by Mr. Gardner. This fleet has proved a nursery of sailors and graduated several famous helmsmen. The Sea Wren is also being built in many parts, and giving good sport wherever raced. The small boat and the small boy are the two things yachting must have to keep green and flourish.

* * *

I've had no time to bother with the races for next season, but at the New Year will turn to and see what can be done. I expect to start a race from New York to Paris, as planned last Spring; this will be for auxiliary power boats. The Bermuda and Habana Races will also be run, and in regard to the former there will be no radical changes in the conditions, so if you are intending to build go ahead. But this next year the committees in charge of the races will insist upon a strict compliance with the condition, as last year in two cases to my own knowledge boats were allowed to start whose owners had not complied with the conditions.

* * *

You people who are getting up races could do it much better if, instead of waiting until the last minute to get out the conditions and donate the prizes, you would sing out early in the year. Especially it is a good plan to get the cups or trophies built early and to have them displayed, and this cannot well be done until the conditions are formulated. One mistake is putting the annual elections in the Winter and Spring instead of holding them in the Fall. You can do nothing with a retiring board, as the officers going out don't want to act for the officers coming in, so nothing can be done until the new set is elected, and by that time the song of robin is heard in the elm, and the Spring rush is on. If the Club officers were chosen in November or December, the regatta committees could have decks cleared and be ready to stand off for the start by the New Year.

* * *

One thing that hurt yachting was the Auto craze that struck the country and caused men to mortgage their homes and go out and kill their best girls and unfortunate pedestrians on the highways and lowways of the world. Thank goodness this mania is on the wane, and men are coming back to their senses and taking up again the clean, manly pastime of sailing boats. Automobiling up to date is the most dangerous pastime ever devised by man, and its victims are numbered by thousands annually. Yet the very people who indulge in it hold up their hands in horror when they hear of ocean racing in small boats. One good lady who thinks nothing of being dashed along a road at fifty miles an hour, denounced me for enticing her son into an ocean race. So far, although thousands of miles have been raced over there has not been a fatal accident in small boat ocean racing. But don't let that cause you to relax your vigilance or get reckless.

* * *

But so far as a killing amusement automobiling will have to make a stern board to flying. That's the game that will make a hole in the statistics. But this is a fine sport, a real man's sport, a sport that requires courage and skill, and I, for one, hope that it will flourish and grow strong. It is the only sport that vies with sailing in requiring a strong nerve, quick hand, and keen eye. That it is dangerous or hazardous adds to the value, for only such sports are worthy of the real man's love and learning. To the yachtsman this flying will appeal as it will appeal to no other class of men, and many are taking an interest in it. If I was only young you'd find

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me shipped in one of these machines for a race to Bermuda, but my bones are too brittle and my head too white for such ventures.

* * *

It is to be regretted that no sooner was this sport of Aviation born than men seized it and turned it into a money-making enterprise. To drag down and degrade a noble pastime by making a mere dollar-catching enterprise is bad enough for professional showmen, but when a club organized for the purpose of promoting this sport lends its name and aid to such an exploitation it is indeed rotten. You cannot combine sport and money-making without debasing and befouling the former, and no club can lend its name to such a business without forfeiting the respect of every honest sportsman. Thank goodness, there are and never can be any gates to yachting, and it is one of the few sports that can hold out its open hands to the inspection of the world.

* * *

In the last issue was a clever and interesting yarn by one of Caliph's crew about the race to Habana last May. But while admitting the right of a man to have a failing for his own craft, I must take a round-turn on one statement made by my good friend the Doctor, in which he accuses Berneyo of having been well tried out before the start. The truth is Berneyo started perfectly green, the paint not being dry when she left the builder's yard to make the passage to Philadelphia. Caliph had several trial trips before she started, and was more tried out than the Granbery boat. Why Caliph lost the race I cannot say from actual knowledge, but could make a close guess. She should have won, as she is unquestionably a faster craft than Berneyo. Caliph started very much overloaded. She was a sight with stores and all other needful things. Had Caliph gone down outside the Stream instead of following the coast she would have done better, as the distance by the outside route is at least fifty miles shorter, and far less rough. Anyhow, in all this post-mortem talk, a party who had much to do with the winning is seldom mentioned, yet it was his constant presence and gentle oily persistence that did much to gain the prize. All thanks to old Zurn Oil who took most of the rub off the job.

* * *

At last, after considerable coaxing, I have introduced the long-distance race into European waters. The Scotch, Irish and Swedish clubs have taken up the idea and have held this gone season, and are planning for the coming, several events. Nothing has ever been invented that has so energized the sport, improved the craft, and made sailors of the men like these long races. The fear of the sea fades before them, and those who take part in such contests lose all dread of deep water voyaging. May this end of the sport long live under every flag and in every sea.

* * *

The March issue of this magazine is going to be a clipper, and I advise all hands who are not on the books to get in an order at once. The leading story is one of Newport from the clever pen of Mr. Thompson, with illustrations by Mr. Norman Black and Mr. Warren Sheppard. There will also be a long list of illustrated boats for sale, and I implore those who are intending to advertise their craft to send in the picture and copy at once, as we want to get to work on that job now. Also kindly renew your subscriptions early, so that we can gauge how many copies to print of the early numbers, and not be caught high and dry as we were last year. If convenient, subscribe for three years instead of one, as it saves a lot of trouble both to yourself and THE RUDDER crew. If you have a friend you want to give a Christmas present to give him a subscription to this magazine, and he won't forget you next Summer when you are short-handed and ship in the other fellow's boat.

* * *

In regard to the pictures of Spray, you will all have to exercise a little patience. We found that the ones sent out were damaged in the mail, and are holding the rest until we can devise some means of getting them to you in good condition. It will most likely be the first of the year before we are in shape to do this. But have patience, as you will get the picture if a subscriber.

* * *

Next watch I'll do my best to stand a longer and more cheerful one, as probably there will be a shift of wind and a failing sea, but you all ease up on me this time. Another year gone by, boys, and the old RUDDER is still afloat and carrying sail What voyages we have made together! In the last year I've lost a number of old hands. Men who stood by me through storm and calm for many passages, wayed and sailed across the uncharted sea to the port whence no ship returns. But it is folly to eye the wake when free and clear lies the course ahead. It is ours to mind the helm, check the braces and keep everything drawing fore-and-aft so long as we are on watch. So cheer up, and pass the word for all hands to muster aft, the Old Man wants to see you; he wants to thank you for standing-by, and doing your best for the sport; he wants to ask your good services for the future, and he wants to wish you all a happy voyage, a smooth sea and a fair wind, during the year 1911.

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THE RUDDER

No. VI

Vol. XXIV

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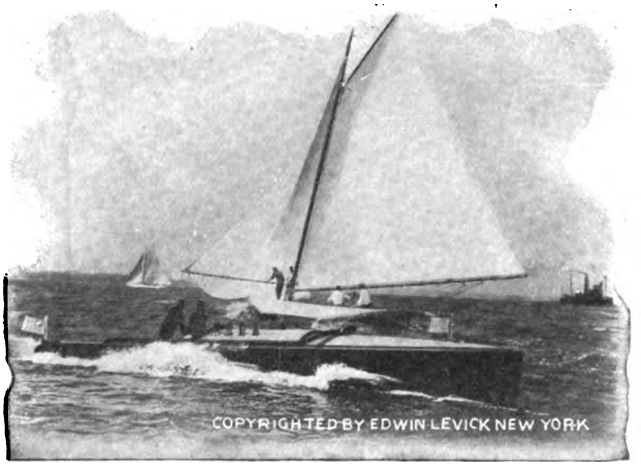

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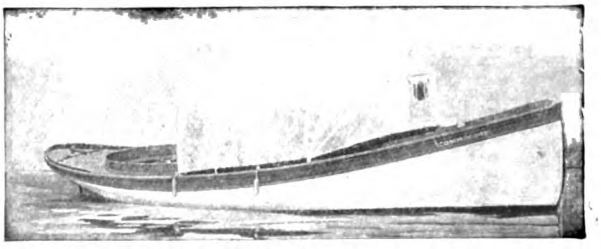

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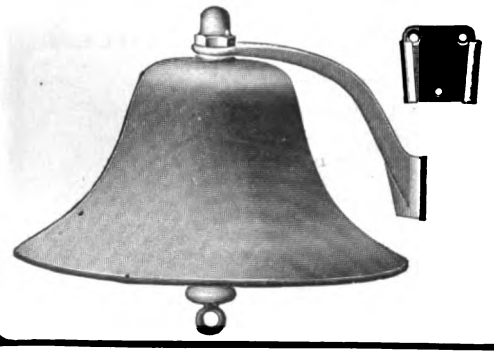

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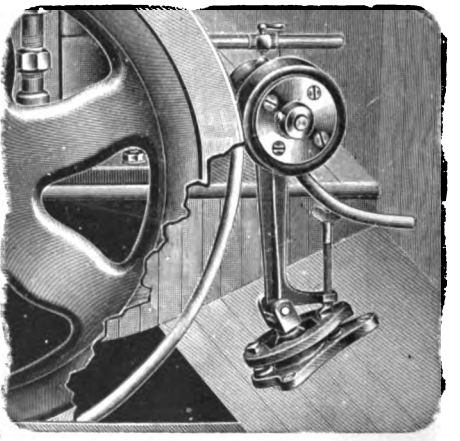

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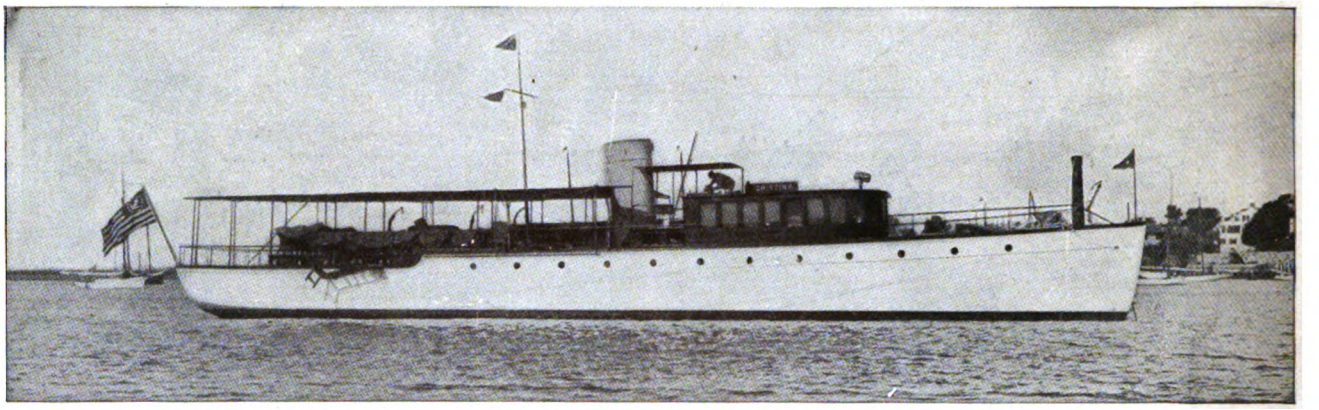

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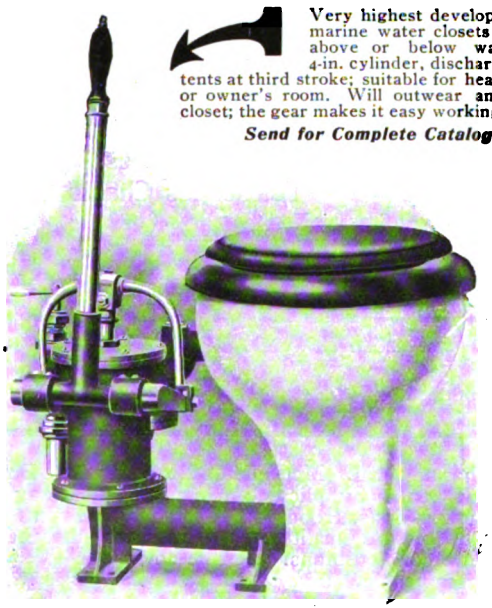

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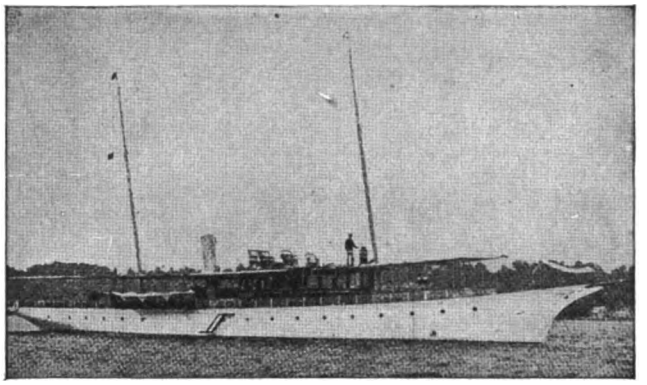

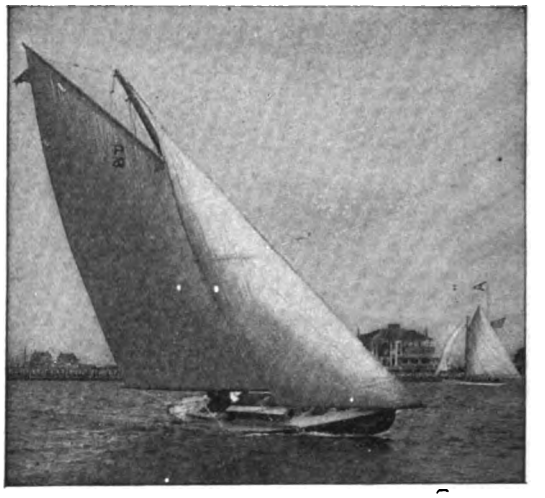

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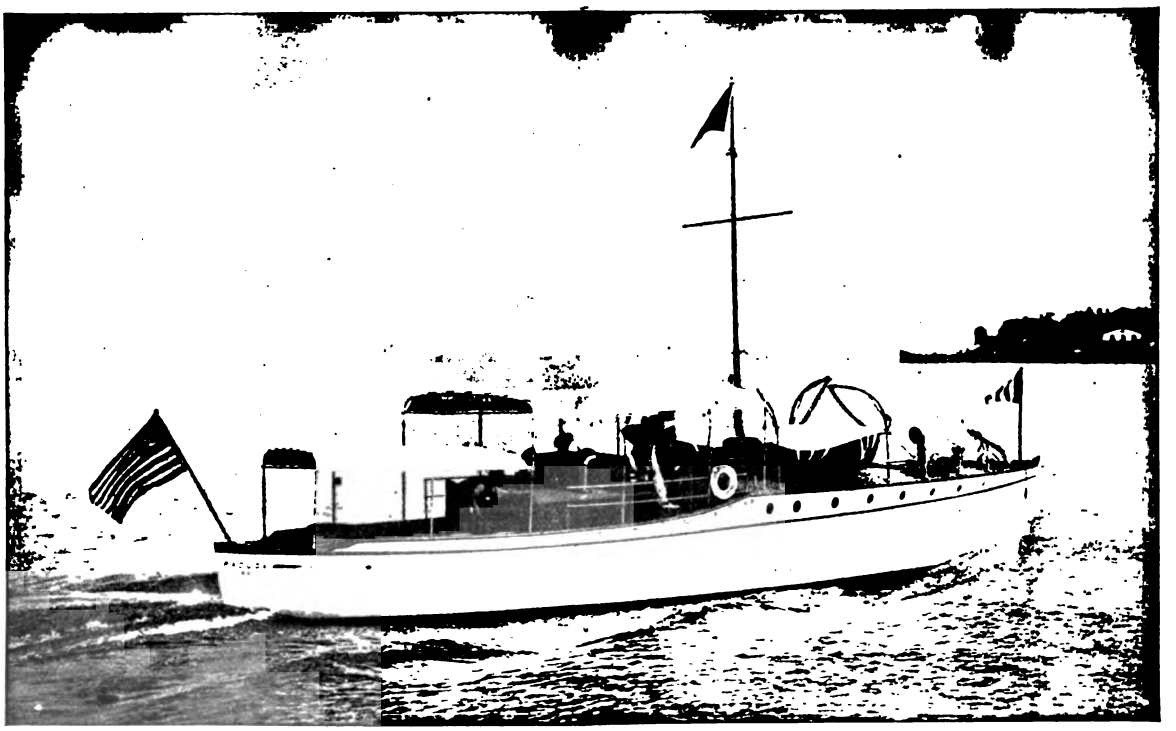

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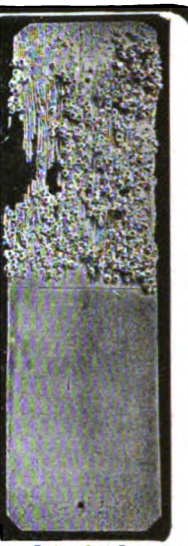

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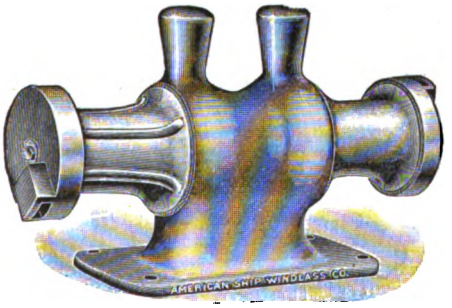

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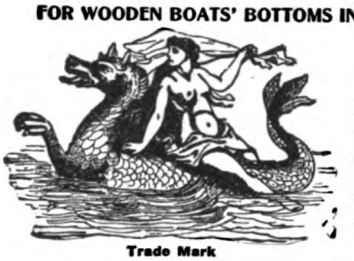

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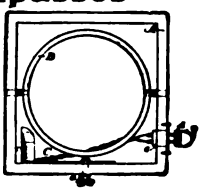

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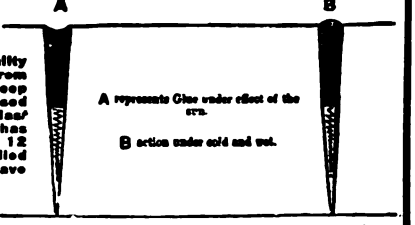

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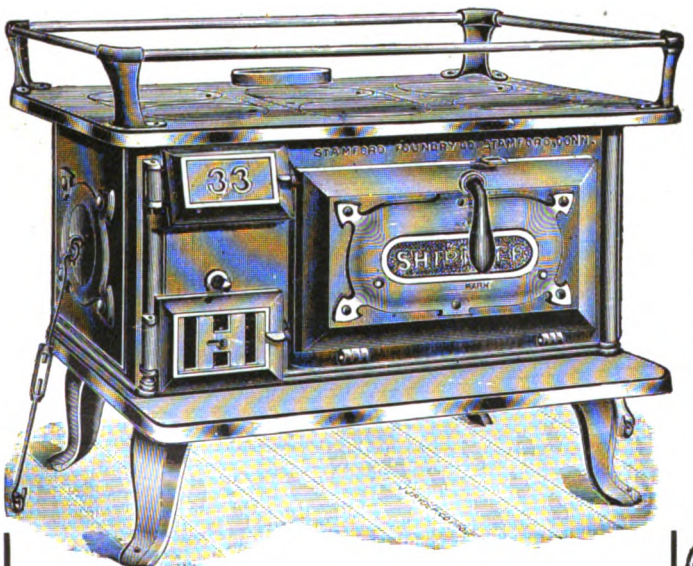

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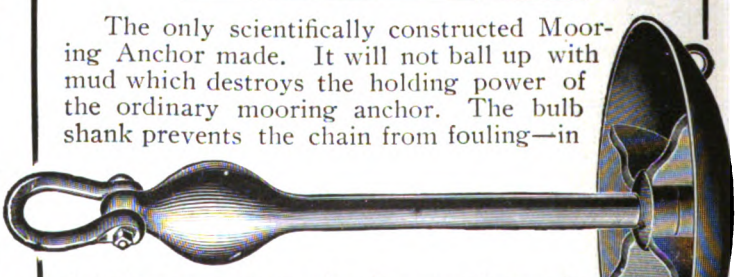

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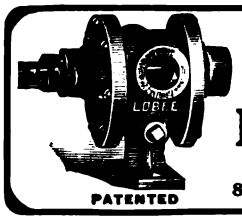

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84 East Street BUFFALO, N. Y.

Cut cost of upkeep and insure your motor mechanism against friction damage with
Dixon's Graphite Lubricants
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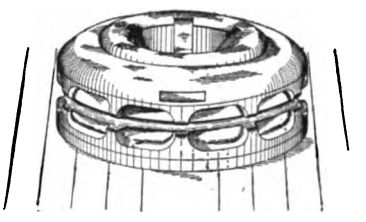
Manufacturers of Marine Hardware and Yacht Supplies



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Send for circulars describing same.
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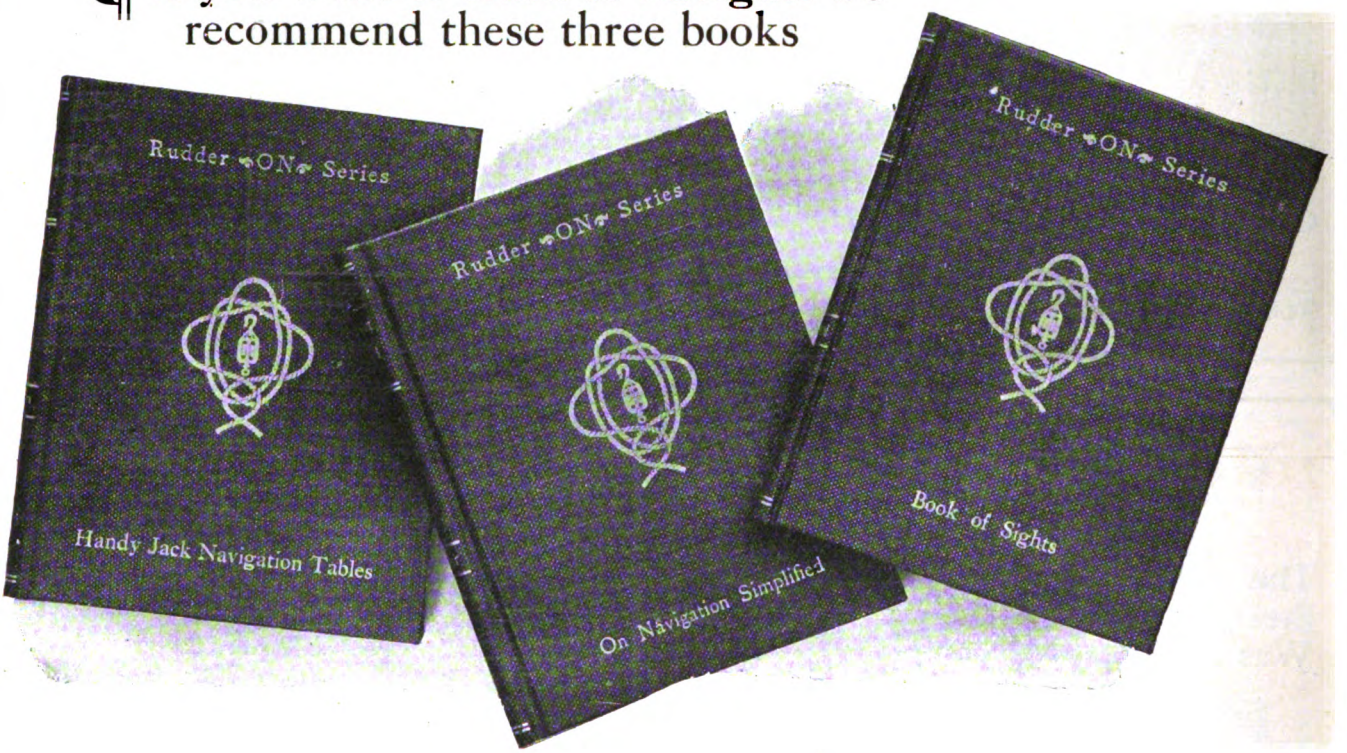

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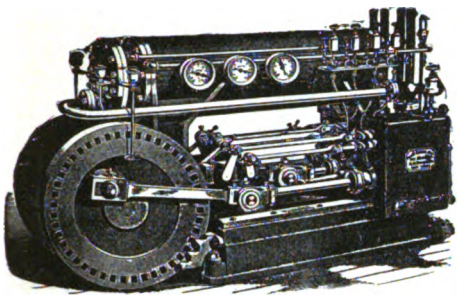
The Allen Dense-Air Ice Machine

contains no chemicals. It is placed in the engine room, while the ice-making box and meat rooms are at distant places of the steamer



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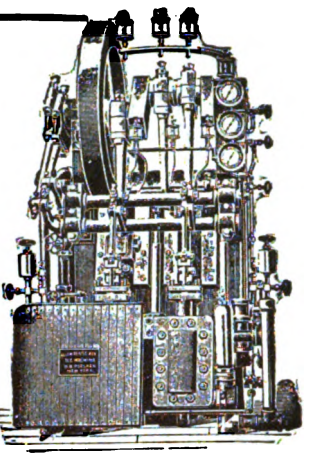

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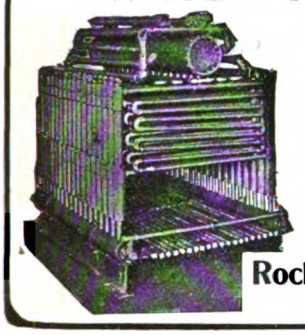

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No left hand threads in this boiler
Can be readily taken apart and put together
Perfect circulation and abundant steam room

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Boilers

Electra	**Dreamer**
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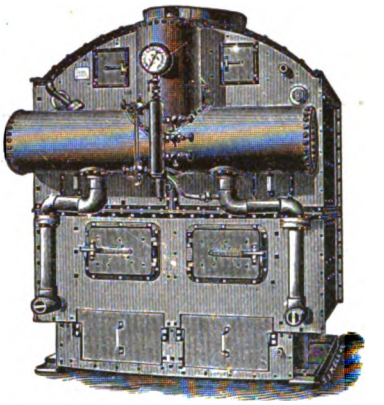
Sapphire	**Satanella**



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"Sands" Marine Sanitary Fixtures

Easy Acting, Safe and Reliable, The Product of Long Experience and Tireless Experiment

PLATE S-28

The "Maroo" Improved Pump Water Closet, oval pedestal bowl, cabinet finished oak seat and cover; heavy N. P. brass post hinges; **high-grade composition 3 in. combined supply and waste pump** with **automatic safety water supply foot valve,** polished trimmings, pump rough.

Complete as shown and described . . . $75.00
If with mahogany seat and cover, add . . 2.00

OUR EXPERIENCE OF SIXTY YEARS IN THE MANUFACTURE OF MARINE PLUMBING FIXTURES HAS PROVEN TO US THAT THE MOST SATISFACTORY VALVE FOR A PUMP WATER CLOSET IS THE FLAT VALVE OF HIGH-GRADE LEATHER ESPECIALLY PREPARED AND USED BY US IN OUR FIXTURES

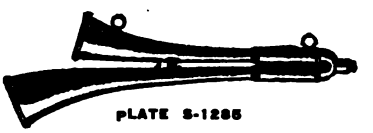

PLATE S-1285

Motor Boat Signal Two-Tone Horn with mouthpiece. Fulfills the U. S. Government requirements as signaling device for small boats, highly-polished brass and nickeled-plated. Length 10¾ inches.

Style "A"—Arranged with rings for fastening cord. German Silver mouthpiece.

Polished Brass $2.28

Style "B"—Arranged with bracket to screw to deck; blown through Removable Extension tube.

Polished Brass $2.25

Mohair-Covered Rubber Extension Tube, length with **Mouthpiece** and connection to horn . **0.78**

PLATE S-128

The "Glenora" Composition Flange and Coupling for use on supply and discharge pipe of closets, straight or bent coupling. Bent lead pipe coupling always sent unless otherwise ordered.

Price

¾	in.	$2.25
1	in.	3.00
1½	in.	5.25
2	in.	8.00

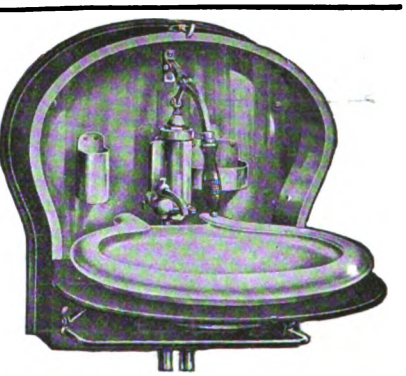

PLATE S-150

The "Glenwood" Folding Lavatory, with Vitro-adamant roll rim lipped oval basin, N. P. copper lining, soap and brush holders. **N. P. brass pump with combination swing supply faucet,** N. P. brass towel rack, N. P. brass supply and waste couplings, N. P. brass trimmings.

Quartered oak, polished finish $42.80
Mahogany, polished finish, add 1.50

Dimensions: Height 20 inches, width 19 inches, depth from back to front when closed 6 inches, when open 18 inches oval; basin 15 inches x 12 inches.

FULL LINE OF SINKS, TUBS, VENTILATORS, SHOWERS, PORTLIGHTS, PUMPS and DECK PLATES SHOWN IN CATALOG "B" FREE UPON APPLICATION

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THE WORLD-CIRCLING SPRAY

A Picture of Captain Joshua Slocum's Famous Sloop

now missing, with its skilled and adventurous owner.

PAINTED BY WARREN SHEPPARD

(The Prince of Sea Painters)

The picture is a magnificent piece of coloring, reproduced without regard to time and expense by

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whose excellent color work is familiar to all Rudder readers. It is of the same size (14 x 20½) as the Half-Moon Picture, and will make a fine companion piece for that unique work. LISTEN: This picture of Spray will not be sold, and can be obtained in only one way—

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Eagle Marine Engines for 1911

OUR REALIZATION

ANNOUNCEMENT

For eleven years we have had in mind conditions such as we are now privileged to announce. That is, a factory so complete both in machinery and equipment that would place us in an independent position from all outside considerations.

For eleven years we have built and supplied Marine Engines of such high quality, that regardless of our efforts to meet the demand we have each year been obliged to disappoint our agents on deliveries. During the season of 1909, at which time we placed our new line of engines on the market, we tripled our capacity, and now at the end of the 1910 season we find the same condition of shortage. To-day we are under full headway for 1911, as our agents are demanding "Eagle Engines" and then more "Eagle Engines."

OUR NEW FACTORY

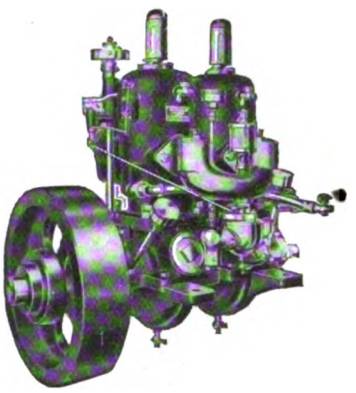
It is with pleasure we announce the opening of our immense new factory with a Capital of $1,500,000, at 98 Warren Street, Newark, N. J., fitted with the most modern automatic machinery (many of which have been constructed from designs of our own engineers, and the like of which cannot be found even in the most up-to-date automobile factories). This will enable us to build engines for marine service of such accuracy and interchangeability such as the Public has never imagined possible.

In acquiring this new home we have installed one of the finest and most complete foundries to be found anywhere. This feature facilitates our work, makes us independent of outside delays, and enables us to maintain a standard in material which we have always desired. We have also installed a complete set of ovens for baking the enamel finish on our engines, which for years has been one of their distinctive marks of elegance.

This new factory is the realization of years of planning. We have dreamed of a factory for the housing of our engine business, such as we now possess. We have planned to use just such wonderful machinery and to utilize our perfect organization in the manufacture and sale of Eagle Engines, and to think this period is now at hand, that our anticipations are now realities, and that these facilities and conditions will enable us to benefit all users of marine engines, we assure you the penning of these lines is an exceptional event in our career.

"EAGLES" ONLY

The public as well as our agents must appreciate the value of our copyright name "Eagle" as applying to marine engines. We have never failed to supply parts for an engine bearing this name, even though at times such parts have cost us many times more than the sale price. Our policy is to care for our customers. Eagle engines have never been sold under any other name; from year to year they remain "Eagles" for the reason that our machines are such that we do not fear the man to whom we have once sold an engine. We want our customers to remain our friends, and any demand in reason will keep them so, as far as we are concerned. You are not required to purchase engines under the name "Eagle" this year and a new name the next. They always remain "Eagles" and we are zealous of the name and reputation. Each year we endeavor to advance our engines in the newer and finer details of fittings and construction. This principle enables us to state to-day that we are so far in advance in two-cycle marine construction that it will require a colossal effort to even meet such Quality and Competition as we will offer for 1911.



Our New 1911 Double Cylinder Model
Made in two sizes, 3¾ x 4 - 4½ x 6
In 1, 2, 3 and 4 Cylinders

ABILITY and INTEGRITY

No institution rises above the individuality and character of its owners, and it is becoming more and more important for a purchaser to know what kind of ability and integrity are back of his engine. It is needless to say that Eagle Engines have for eleven years represented all that is desirable in engines of the marine type, especially as regards Quality, Finish, Efficiency and Durability.

For the first time in the history of the marine engine business one is enabled to purchase an engine constructed by the highest class of engineering ability, including material such as has never before been supplied, and an equipment that has set a standard at a competitive price. We are giving you more for your money in the Eagle line of engines and equipment than it is possible to procure elsewhere. While we insist on quality, this does not infer that we aim to waste money in shams. Our engines are just as elegant on the inside to the eye of the finished mechanic as they are to the observing public from the outside. To sum it all up, the Beauty of Eagle Marine Engines is in their simple Elegance, Harmony of Proportion, Excellence of Material, and Equipments.

QUALITY IS NOT PATENTABLE

No manufacturer controls it. Style, workmanship, material and finish, however, are matters of *intuition*, *training*, *taste* and *experience*. Our aims are high, our facilities for manufacturing of the best, our trained craftsmen are at our command to interpret our wishes relative to the standard we desire to maintain.

EQUIPMENTS

Price of Equipment Depending Upon Outfit is a Rare Delusion

You should realize that where you are quoted on equipments with variation of price from twelve to forty dollars, depending on what the offer is, that in order to secure what we supply as a regular equipment, it will be safe for you to figure that if you want a salt-water outfit and high-grade equipment you will be charged the long price, and after the long price you will find that you still lack such an equipment as the Eagle Company supplies regularly with each and every engine of their manufacture. We are not only setting a standard on engines but also on equipments, and you should inform yourself particularly as to just what you are getting by being charged extra compared to what we supply as a regular outfit.

CATALOG

Secure a copy of our new catalog; it is free merely for the asking, and really it is worth your time to make the request. You will find a great amount of information that will interest you, and take our word that it is nicely printed and handsomely illustrated. Our Handsome Illustrated Catalog Mailed Free Upon Request

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EAGLE MARINE ENGINES—DURABLE—SIMPLE—EFFICIENT

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QUARTER-DECK TALK

LARCHMONT YACHT CLUB MEETING

A special meeting was held Nov. 16, Commodore Leonard Richards presiding. It was called for the purpose of amending the Constitution and By-laws, and to lay before the members the financial condition of the club. This, according to a lengthy statement by Treasurer William Murray, and supplemented by a brief recapitulation by Commodore Richards, shows the club to be some $20,000 better off than it was at this time last year.

There was a long discussion upon an amendment to Section 1 of Article XI of the Constitution of Eugene Bushe by which voting by proxy in future shall not be allowed. Justice Francis M. Scott, Justice J. P. Clarke, and Philip T. Dodge all spoke in favor of the resolution, and it was finally carried by unanimous vote. The date of the annual meeting has been changed to the first Wednesday in December.

* * *

MOTOR-BOAT CLUB ELECTION

An enthusiastic meeting of the Motor Boat Club of America was held on the evening of Nov. 16, at the Automobile Club of America, and the following officers were elected for the ensuing year: Commodore, H. H. Melville; Vice Commodore, F. K. Burnham; Rear Commodore, J. Stuart Blackton; Secretary, F. N. Morley; and Treasurer, Charles Francis.

The Constitution of the club was amended so as to provide for a board of fifteen Trustees instead of eleven, and this board was elected as follows: Albert E. Smith, August Heckscher, J. H. Hoadley, John M. Shaw, Charles P. Tower, H. R. Sutphen, F. G. C. Lyon, H. Archie Pell, E. J. Steiner, and M. M. Whitaker.

There was a large attendance, and it was stated that plans were under way for a number of fast motor boats which would be built to defend the Harmsworth International Trophy, which has twice been won by the Motor Boat Club of America.

* * *

TO PROPEL SHIPS BY WAVES' ACTION

John Luck, of Brooklyn, has devised a plan to apply wave power to the propulsion of vessels crossing the ocean. At his home, No. 1,506 Newkirk Avenue, he has on exhibition a model of his invention.

It represents the hull of a vessel equipped with water tanks fore and aft. In the center of the craft is a piston rod operated by a series of cogwheels, which furnishes motor power for the ship. Theoretically the weight of water stored in the tanks will be sufficient to put the machinery in motion and move the ship. This force will be applied by the rise and fall of the hull, occasioned by the action of the waves.

If, for instance, a wave five feet high should strike the vessel astern, tons of force would be thrown upon the operating machinery, which would be simultaneously affected by the suction of the receding waters in other tanks at the opposite end of the boat. It would not, therefore, affect the power of propulsion if the tides were adverse to the course of the ship.

Rocking of the boat by cross currents would have no effect on the power pressure. The device is of simple construction, and the inventor asserts that its cost would be saved in a week by the saving of fuel and labor.

* * *

SONDER BOAT SOLD

Lashed to the forward deck of the steamship Bound Brook is the fast sonder boat Corinthian, formerly owned by ex-Police Commissioner C. P. Curtis. The Bound Brook sailed for Jamaican ports and the Corinthian will be delivered at Kingston. She will be the first craft of that type ever sailed in West India waters. She has been purchased by Thomas F. Mould, a member of the Royal Jamaican Yacht Club.

It is believed that a class for sonder boats will be established by the club and be shipped from here in the near future.

The Corinthian is about 34 feet long on deck and 20 feet on the water line, with a draught of about 5 feet. Her lead keel weighs nearly a ton. This boat was sold by Hollis Burgess yacht agency.

SOLD IN CUBA

The Camden-Rockland Company report the sale of several motors in Cuba through The Rudder. These will be fitted with the company attachment for using alcohol, a fluid which is much cheaper in Cuba than gasolene.

* * *

DEMAND FOR HEAVY-OIL ENGINES

The leading foreign demand is for motors using kerosene, alcohol, or distillate. There is a wide market for such engines throughout the tropic and semi-tropic regions. The department is also receiving inquiries for shoal-draft boats for war service in various localities.

* * *

GASOLENE FREIGHT TUG

We have received word from one of our correspondents at Pearl Lugom, Nicaragua, that the tug Puerto Perlas which was sent down there from New York under her own power is working satisfactorily. She is engaged in towing barges loaded with bananas on the Wawashan River. The Puerto Perlas is equipped with two 36-H. P. Wolverine engines. The same correspondent also says there are several Barber engines in the same locality and that they are giving excellent service.

* * *

NEWPORT YACHT CLUB

At the annual meeting of the Newport Y. C. the following officers were elected for the coming year: Commodore—Philip Caswell. Vice Commodore—Edward T. Treichel. Rear Commodore—Lester L. Savery. Secretary—James P. Cozzens. Treasurer—George B. Austin. Measurer—J. Everett Benson. Regatta Committee—W. M. Arnold, J. G. Costello, W. D. Hazard, Harry Williams, W. G. Kerr. House Committee—J. A. Allen, Simon Hart, D. E. Young, H. W. Whipple, J. W. Wilson. Finance Committee—J. H. Scannevin, A. L. Slocum, G. H. Draper. Library Committee—F. A. Corbett, W. L. Eddy, H. W. Boudreau. Model Committee—F. H. Scannevin, H. D. Root, F. J. Logler. Entertainment Committee—D. J. McGowan, H. D. Frasch, F. W. Lawton.

* * *

BOSTON SHOW

The annual banquet and meeting of the New England Engine and Boat Association was held in Youngs' Hotel last Monday, Oct. 17. The entire board of directors and officers of the past year were unanimously re-elected for the ensuing year. They consisted of Geo. W. Campbell, President; George Lawley, Vice-President; Chas. J. Jager, Treasurer; and Chester I. Campbell, Secretary. These officers, with W. J. Young, J. S. Poyen, A. W. Toppan, W. J. Forbes, and Arthur W. Dodge, comprise the board of directors. Considerable discussion was given to the affairs of the coming National Motor Boat Show to be held in Mechanics' Building, January 28th to Feby. 4th, inclusive. From present indications this, the eighth annual show in Boston will far eclipse those of the past. More entries are being received, and the interest on the part of the manufacturers of engines and the boat-builders is intense. Many entries of champion speed boats have come in, and a particularly fine showing of pleasure craft is assured. The matter of the annual races by the association was brought up and plans put underway to make 1911 even more successful than 1910 in that respect. The races held this past summer at Winthrop and on the Charles showed conclusively the hold that this class of boats has on the public interest. The races attracted much attention and were well contested.

* * *

HEAVY-OIL ATTACHMENT

The Knox Engine, made by the Camden Anchor-Rockland Machine Company, are selling the wide world over. Mr. Bird, general manager of the company, reports sales in Spain, Queensland, Figi, West Australia, Newfoundland, and other lands far and near. These orders came through the company's advertisement in The Rudder. The Knox makers want especially to call the attention of tropical boatmen to their attachment for using kerosene, alcohol or distillate.

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Regal Users Write OUR Advertisements

"It gives me great pleasure to state that our six horse-power Regal engine purchased 2½ years ago is still in the game and giving us no trouble whatever. We average about twenty miles a day every day in the week and so far she has never refused to start and in fact hasn't even missed an explosion.

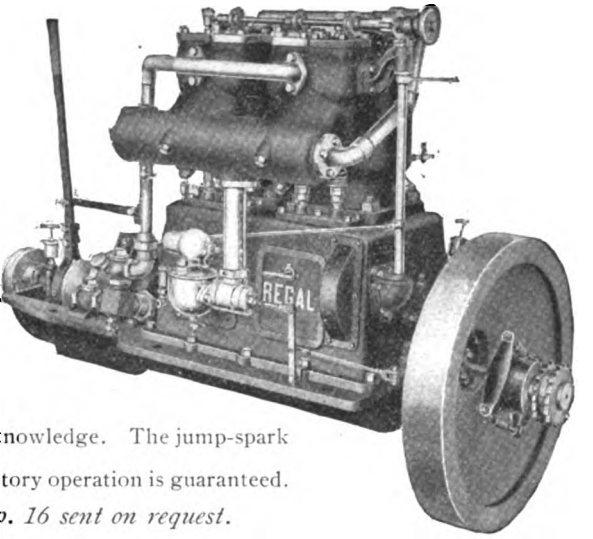
"We work her through all kinds of weather and she always delivers the goods. We recently took a trip of about one hundred miles, working her hard all day, and part of the way through a heavy sea, and she never missed an explosion.

"I think we can truthfully say that (outside of three other Regals here in the Bay) there is not another engine here in one-hundred-and-fifty boats that has a record to match ours.

"We have started the engine several times by simply moving the timer and we never have to throw the wheel over more than twice to get her in motion.

"We cannot say enough in credit to your product and we always recommend a Regal to all prospective buyers. You may refer any one to us and we will gladly recommend or demonstrate your product."

F. W. CHAFFEE, St. Albans, Vt.



REGAL GASOLINE ENGINES

are built to run and do it. Reliability is their strong point as their owners acknowledge. The jump-spark ignition is sure; the positive oil feed insures perfect lubrication.

Built for high speed or heavy duty; 1 to 4 cylinder; 3 to 45 h.p. Satisfactory operation is guaranteed.

Do not buy a marine engine until you at least read Catalog No. 16 sent on request.

REGAL GASOLINE ENGINE CO. **59 W. Pearl St., Coldwater, Mich.**

REGAL ENGINES MAY BE SEEN AT ANY OF THE FOLLOWING:

Seager Engine Works, 65 Beverly St., Boston, Mass.
Marine Equipment & Supply Co., 55 N. 7th St., Philadelphia, Pa.
Palmer & Moore Co., Inc., Reedville, Va.
A. Baldwin & Co., Ltd., Cor. Camp & Common Sts., New Orleans, La.
The Hinton Electric Co., Ltd., 911 Government St., Victoria, B. C.
The Caldwell Bros. Co., 1014 First Ave. South, Seattle, Wash.
The Caldwell Bros. Co., 1746 Pacific Ave., Tacoma, Wash.
Reierson Machinery Co., 182 Morrison St., Portland, Ore.
Rix Compressed Air & Drill Co., 219 Spear St., San Francisco, Cal.
Rix Compressed Air & Drill Co., 120 East Third St., Los Angeles, Cal.

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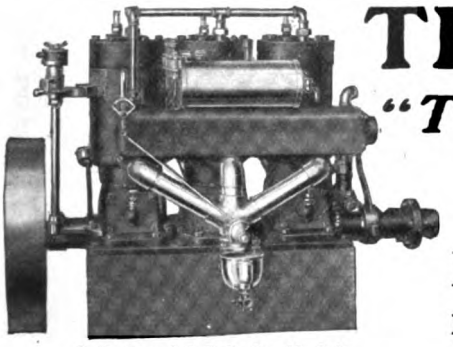

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Look carefully into the record of the various motors in your locality—their reliability, fuel consumption, cost of repairs, delays for breakdowns, ease of operation, actual interchangeability of parts, power developed, in fact make a thorough comparison and you will find the reason why the Bridgeport motor is the most successful motor on the market.

Send for Catalog and our Special Booklet entitled "It's Up to You."

THE BRIDGEPORT MOTOR CO., Inc., Bridgeport, Conn.

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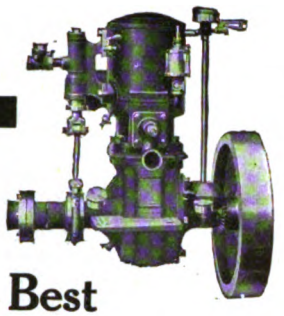


2 H.P.
$48

All Complete, Ready to Install

"The Best Little Engine on the River"

So says W. H. Hudson, of Melville, La., in writing about his 6 H.P. Caille **PERFECTION**

He also says: "Since Oct. 15th, 1909, I have run her every day in the week, towed over 75,000 logs and have not had 10 cents' worth of repairs."

Mr. Boat-owner, can your engine equal this record? It's an unusual record for a marine engine, but the *usual* record of a Caille Perfection. We'll be pleased to have you write Mr. Hudson and confirm these facts.

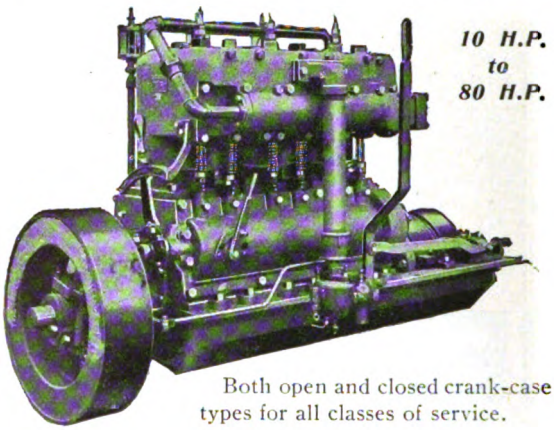
WE WANT TO SHOW YOU

that the PERFECTION is the strongest, most dependable, easiest running marine engine ever put into a boat. Built like a watch. Each part made of best materials, perfectly balanced, faultlessly finished, assembled by past masters in marine engine building and given the severest test of any engine in the world. Built right to run right and stay right. Fifteen years the best.

2 H.P., $48, 6 H.P., $95; others, up to 30 H. P., at proportionately low prices. A size for every boat. Every PERFECTION is sold with a guarantee of money back or free replacement. For the sake of *your* pocketbook, let us send you full information about Perfection engines and name of nearest dealer.

Caille Perfection Motor Co.
57 Amsterdam Ave. Detroit, Mich.

Clifton Marine Engines



10 H.P. to 80 H.P.

Both open and closed crank-case types for all classes of service.

The Clifton Motor Works

230 East Clifton Ave., Cincinnati, Ohio

W. K. Thomas, Motor Mart Buildings, 1876 Broadway, N. Y. City
Loane-Hiltz Engineering Co., 306 South Hanover St., Baltimore, Md.
Albert M. Darling, Northwestern Representative, Olympia, Wash.
C. T. Patterson Co., New Orleans, La.
Hayward & Garrett, Exclusive Agents, Dunedin, New Zealand.
Gray-Aldrich Company, Inc., 7 & 8 Commercial Wharf, Boston, Mass.
National Engineering Co., 419 Cordova St., Vancouver, B. C., Canada.

For electric lighting of your yacht, motor boat or houseboat

The New Edison Storage Battery

has a number of definite advantages over all other batteries.

First, the Edison is not injured by standing idle for any length of time, either charged or discharged. With other storage batteries, when left idle for any length of time, there is a constant automatic discharge and deterioration.

Second, the Edison takes up much less room than other batteries of equal capacity.

Third, the weight of the Edison is just 72% of that of the lead battery of equal capacity.

Fourth, no rubber jars to crack or leak. The container of the Edison is welded, nickeled steel.

Fifth, the Edison is not injured by overcharging, by too rapid discharge, or by complete discharge.

For Ignition

The Edison Storage Battery gives a hot, blue spark like that of the high-tension magneto, but with none of the magneto's disadvantages. While a novice can install and connect the Edison, it takes an expert on gears to install the magneto and to put it right if it gets out of order.

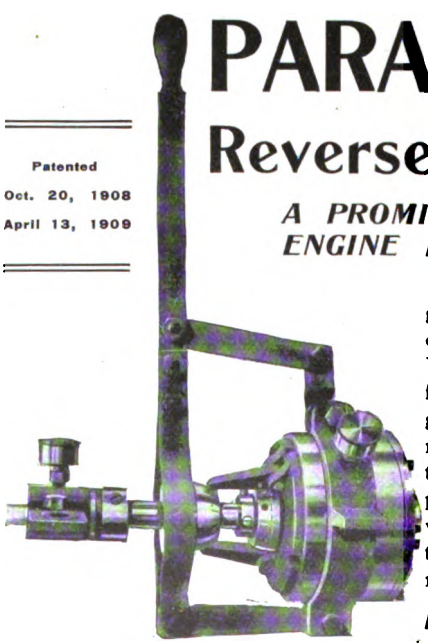
Write us to-day for complete information regarding the use of the New Edison Storage Battery for both of these purposes.

Edison Storage Battery Company, 113 Lakeside Ave., Orange, N. J.

What others say about the

PARAGON Reverse Gear

Patented
Oct. 20, 1908
April 13, 1909



A PROMINENT ENGINE BUILDER

"There is but one good reverse gear on the market. We do not manufacture reverse gears but having made exhaustive tests with the most prominent makes we are in a position to recommend most highly the ***PARAGON.***"

SOLE MANUFACTURERS

EVANS STAMPING & PLATING COMPANY

Draw 882 **Taunton, Mass., U. S. A.**

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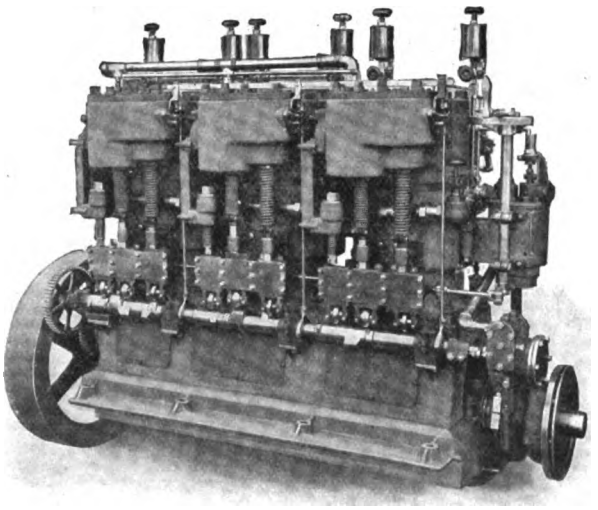


THE LEADER FOR TWENTY YEARS

GLOBE

THE REAL HEAVY-DUTY ENGINE

Whenever it is a question of power for a heavy cruising or commercial boat the "GLOBE" is almost invariably selected. WHY?

Will Outwork and Outlast any Engine on the Market

SEND FOR CATALOG NO. 26. SPECIAL PRICES FOR EXPORT

Pennsylvania Iron Works Co., Eddystone, Pa.

WE HAVE SOME GOOD REBUILT ENGINES FOR SALE

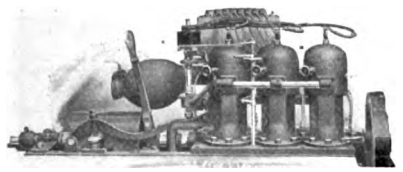
Judge an Engine and Boat by Its History

Don't buy an engine or a boat on *promises*.

Don't listen to talk about what the engine *will* do. Find out what it *has* done.

Compare the actual History of the engine and boat you *thought* was best with that of the

ROCHESTER



Engines and Boats

Find (if you can) an engine of corresponding price whose record can equal the ROCHESTER'S.

For 12 years, in every contest this engine has entered, it has proved its surprising quality.

"She seems to be proof against trouble." That's what one racing owner says. You can't afford a faulty, "fussy" engine. It spoils all the fun. Don't make a mistake. Find out all about the ROCHESTER engines and boats. Send for details and catalog. Send to-day.

1910 models, one to six cylinders, 4 to 48-H.P. Immediate deliveries. Mechanical oilers. Atwater Kent Ignition. Gasolene or kerosene.

ROCHESTER GAS ENGINE COMPANY

691 Driving Park Avenue
Rochester, N. Y.

1928 Broadway
New York City

Stanley Marine Motor

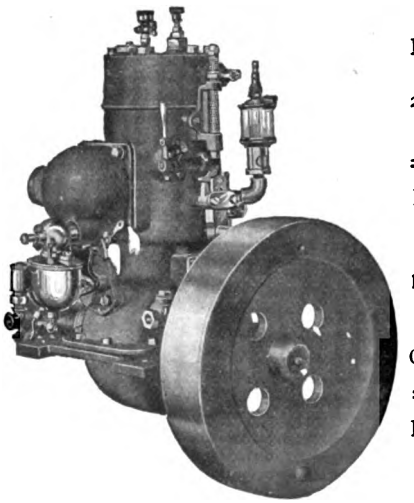
Make-and-Break Ignition

STRONG DURABLE RELIABLE

Two-Cycle Two-Port

Water-Cooled Exhaust

Single and Double Cylinder



Made in Sizes 2½ to 15 H.P.

Highly developed for power to given size of Cylinder

Low in Price

5 Horse-Power Motor

Our Catalog is full of information for all who are about to decide upon a motor. Write for it. It will interest you.

THE STANLEY CO., 79 Milk St., Boston, Mass.

Koukokusha ni otegami onsashidashi no saiwa dozo RUDDER nite goran no mune onkakisoe negaimasu

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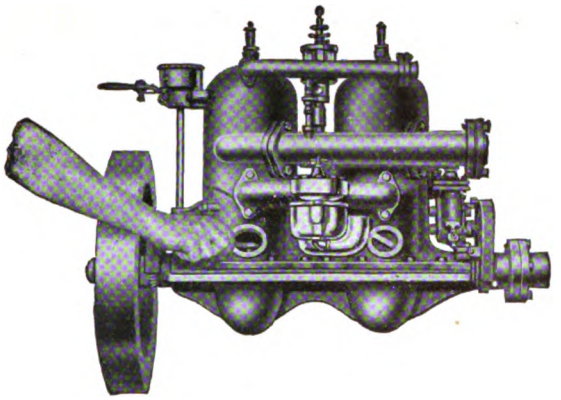
Vim Owners Rarely--If Ever--Change



Easy to "get at" if bearings require adjustment

Medium Speed Sizes	Heavy Duty Sizes
1 cylinder—5 and 9 H.P.	1 cylinder—3½ and 6 H.P.
2 cylinder—10 and 18 H.P.	2 cylinder—12 H.P.
3 cylinder—15 and 22 H.P.	3 cylinder—18 H.P.
4 cylinder—20 and 36 H.P.	

VIM MOTOR

The Most Perfect Two Cycle Motor Made

The increasing volume of Vim sales, year after year, has revealed a condition which, to some, may seem remarkable.

This is, that a Vim owner rarely—if ever—installs any other motor but a Vim in his boat.

If he wants an engine of heavier power—he gets another Vim.

If he buys a new boat—its motor is a Vim.

And we are adding every year, bear in mind, to the number of unwavering Vim owners.

If you are asked why this condition should exist, you would say the chief reason must be the satisfaction which the Vim brings to every owner, old or new.

By the strength and reliability which are built into it; by its pretty behavior and willing work under poor conditions as well as good; by its immunity from frequent overhaulings and extraordinary repairs, the Vim makes and holds its friends.

It is high time you were learning more about a motor of this character—the more so if you have just passed through a season where pleasure was marred by motor troubles.

The Vim book will be sent if you ask it.

The Vim Motor Manufacturing Co.

441 Market Street, Sandusky, Ohio

Representatives:

Montreal, Ont.
I. L. LaFLEUR, Ltd.

Southwestern New York, Connecticut and Northwestern New Jersey
OTTO GAS ENGINE WORKS
136-138 Liberty St., New York

Portland, Me.
G. D. THORNDYKE MACHINE CO.

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F. B. BURTON

Northwestern Washington
MARINE SUPPLY COMPANY, Tacoma

Philadelphia, Pa.
W. S. CARMAN, Bourse Bldg.

Portland, Ore.
GAS POWER & SUPPLY CO.,

Central New York
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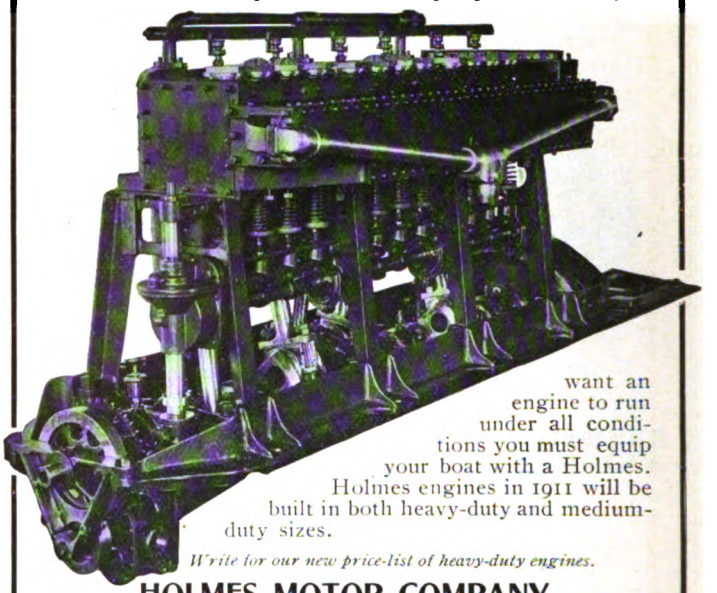
HOLMES

The persistent reliability of Holmes engines in the racing events of the past season is ample proof that if you want an engine to run under all conditions you must equip your boat with a Holmes. Holmes engines in 1911 will be built in both heavy-duty and medium-duty sizes.



Write for our new price-list of heavy-duty engines.

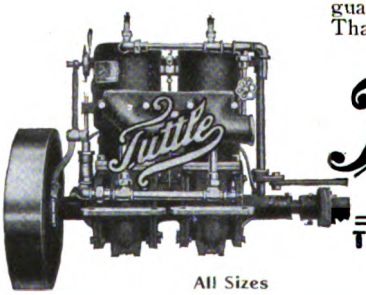
HOLMES MOTOR COMPANY

1 Madison Ave., New York City WEST MYSTIC, CONN.

We are equipped to haul out and lay up for the winter boats up to 150 feet

Concentrated Energy

with an honest, liberal guarantee. That means

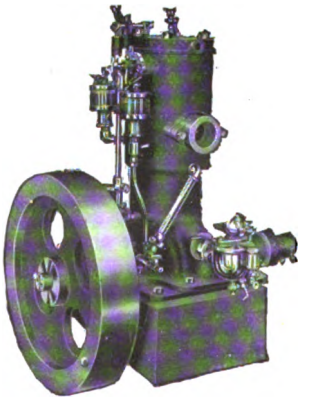


All Sizes

Tuttle

Tell us size required and get price.

THE TUTTLE MOTOR CO.
Formerly D. M. Tuttle Co.
526 HOLDEN STREET
CANASTOTA, N. Y.



THE ROYAL ENGINE

Is the engine that stays, because it is properly designed and built. There are no trappy or complicated features about it. ***Built to Use.*** Carefully inspected at each stage of construction and thoroughly tested. Get our catalog and order an engine that will stand by you and one you will be proud to own.

The Royal Engine Co.

159 Housatonic Avenue
Bridgeport, Conn.

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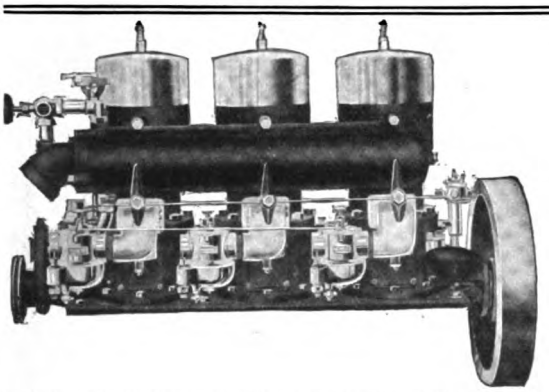
Don't order an engine for that new cruiser or racing boat until you look into the Gray Model "T," 1911 type, for from 12 to 108-H.P. plants



Something New

Kerosene or Gasolene Fuel

Model "T"—12 to 36-H.P., 1, 2 and 3-Cylinder

Two-port, three-port, or combination two and three-port. } Three types combined. You can change from one to the other in three minutes.

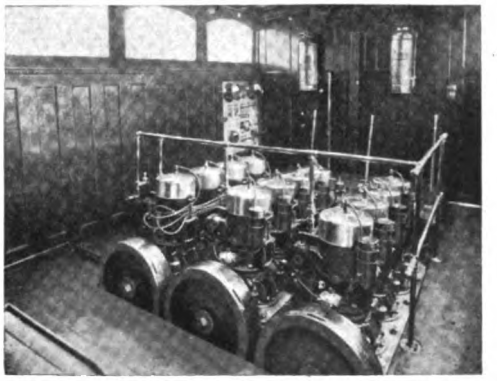
You can have either a two-port or a three-port, motor or a combination of the two and more power for high speed conditions.

THIS MOTOR IS A MARVEL For quality, power, accessibility, up-to-date design and appearance. We have been developing it for two years, and offer it as the culmination of 18 years experience in manufacturing 2-cycle marine motors.

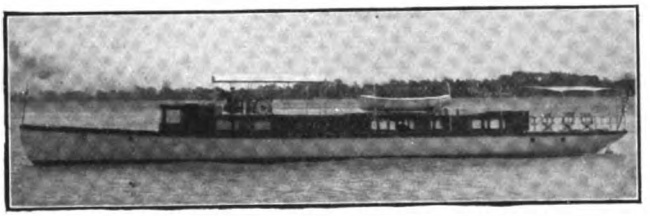
36 and 72 or 108 Horse-Power Plants

36 H.P.—$525.00	**Weight 710 lbs.**
72 H.P.—1050.00	**" 1420 "**
108 H.P.—1575.00	**" 2130 "**

Write and let us point out the advantages of 2 and 3 unit plants for cruising or working boats. For instance, 108-h.p. plant consisting of three of our 36-h.p. Gray Motors will give these advantages among many others: **low first cost, small space occupied, economy of fuel, reliability and extreme efficiency.**

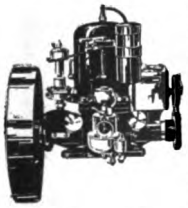


A three-unit Gray plant, including a Gray single-unit electric light plant, in a 95-ft. cruiser.
Write for full description of this boat.



"Viking." 95-ft. Cruiser, equipped with 3-Unit plant Gray Motors. Speed 13½ miles per hour.

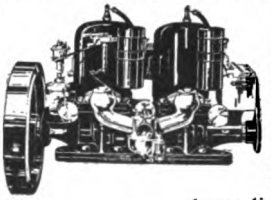
STANDARD MODEL R & S MOTORS



6-H.P.—Power, workmanship and material absolutely guaranteed by a responsible concern. Ready to install in your boat,

Complete $94 to $118

depending upon outfit.

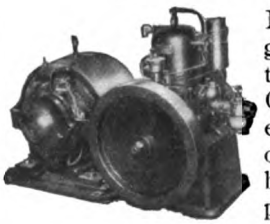


12-H.P.—Guaranteed to develop 14 to 16-h.p. Complete outfit, ready to install in your boat,

$198 to $237

depending upon outfit. This 12-h.p. motor in an official test by the Massachussetts Institute of Technology, developed 17½ h.p.

Electric Light Unit



Motor and generator on the same base. Complete electric light outfit for your boat or other purposes.

GRAY MOTOR COMPANY, 937 Leib Street, Detroit, Mich.

CANADIAN GRAY MOTORS CO., Ltd., 40 River Front, Walkerville, Ontario

Big stocks of Motors in New York, Boston, Chicago, Cincinnati, Baltimore, Milwaukee, San Francisco, Los Angeles and Seattle.

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Bei Bestellungen beziehen Sie sich bitte auf THE RUDDER

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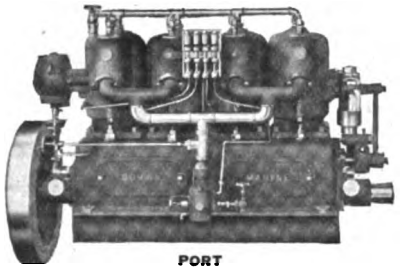
Four Cycle—Medium Weight—Motor of Quality

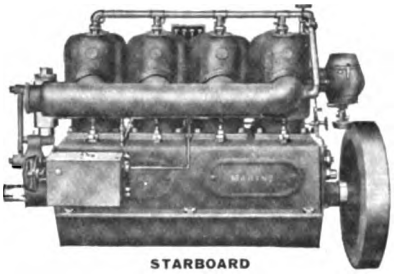

PORT

DOMAN
THE MOTOR of QUALITY

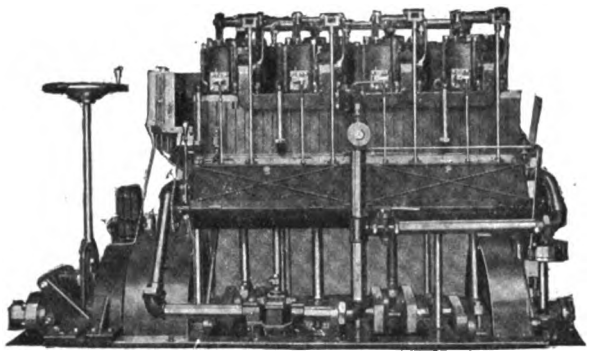
Built in sizes from 5 to 200 H. P., 2 to 8 cyls.

1910 CATALOG

With full information sent on request.


STARBOARD

THE H. C. DOMAN CO. Dept. "C" OSHKOSH, WISCONSIN


60 H.P. ENGINE

Gasolene Yachts and Engines
Noted for Reliability

Tregurtha Water-Tube Boilers — Steam Engines

MURRAY & TREGURTHA CO.

340 West First Street — South Boston, Mass.

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NEW YORK OFFICE: Room 1228, 150 Nassau Street
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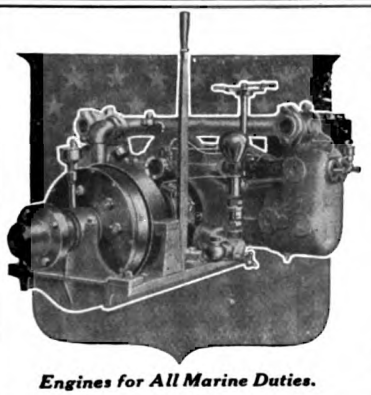

Engines for All Marine Duties.

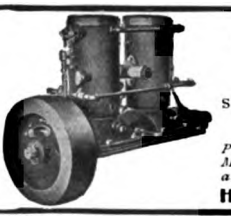
U. S. NAVY MODEL

SINTZ-WALLIN
LEADER

Heavy duty, 5¾ x 6, 2 cylinders used on the largest launches, (36' x 10' 6") on the U. S. Battleships New Jersey, Minnesota, Louisiana.

We shall be mighty glad to tell you all about it.

SINTZ-WALLIN CO.
GRAND RAPIDS, MICH.



ARDMORE ENGINES

1½ to 16 Horsepower, $85 to $400

TWO AND FOUR CYCLE

Simple, durable, compact, easy to start, requires less attention, develops more actual power, has less parts, and gives less trouble than others

Propellers, Tobin Bronze Shafting, Stuffing Boxes, Magnetos, Dynamos, Batteries, Tanks and Engine and Launch Fittings

Want a Catalogue

HENRY KEIDEL & CO., Baltimore, Md.

BARKER MOTORS

"Imitated, but Not Equalled"

Fine mechanical features.
Honest power ratings.
Reasonable prices.

Manufactured by
C. L. BARKER,
Norwalk, - - - Conn.

JAGER ENGINES

Staying Power Conclusively Demonstrated
in this
AUSTRALIAN INSTALLATION

SYDNEY, N. S. W., AUSTRALIA, Feb. 14, 1910.

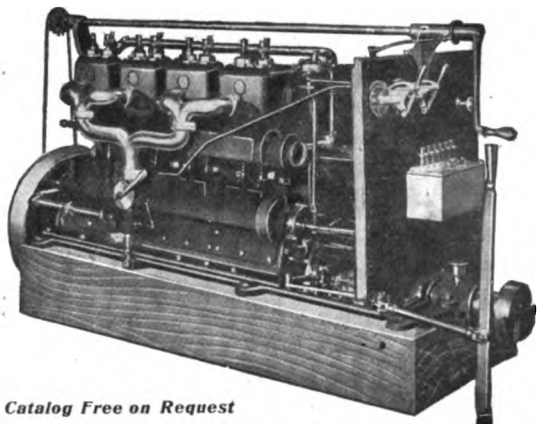
CHARLES J. JAGER COMPANY, Boston, Mass.

Dear Sirs: The 3-H.P. JAGER engine which I have had running in a heavy working boat on my Camden Haven Oyster Fishery, has been in constant service now for about six months, and during that period has given entire satisfaction. I can recommend the JAGER engine to anyone who requires a strong, serviceable, simple and reliable power for their boat. Yours truly, FRED J. GIBBINS.

Our customers epitomize values *after they buy* just as consistently as *before they buy*, because the JAGER engines are GOOD INVESTMENTS. PLEASE SPECIFY YOUR REQUIREMENTS.

We Build 3 H.P. to 200 H.P. in HEAVY-DUTY, SLOW-SPEED, MEDIUM and HIGH-SPEED Types

CHAS. J. JAGER CO., 283 FRANKLIN STREET, BOSTON, MASS.
33 Canal Street, Providence, R. I.


Catalog Free on Request

Hagan el favor mencionar el RUDDER cuando escriven

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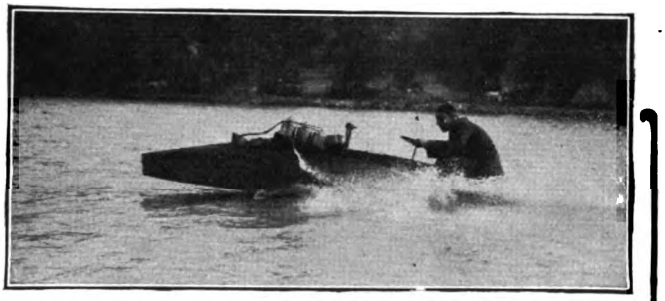


Twelve-Foot Boat Equipped with an ELBRIDGE 3-Cylinder Featherweight Engine Making 25 Miles an Hour.

You don't have to build a big hull to get speed if your motor is right.

ELBRIDGE
MARINE ENGINES

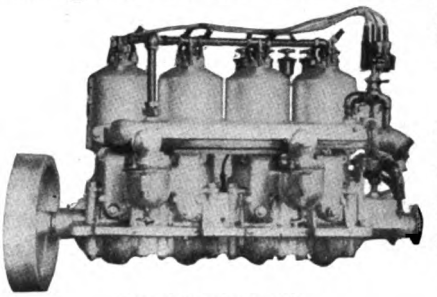
give more power for weight and bulk than any others.
Contains fewer parts than any others.
Do their work easily, efficiently, continuously. Always under perfect control. Run equally well at all speeds.

SEND FOR CATALOG

ELBRIDGE ENGINE COMPANY

27 CULVER ROAD **ROCHESTER, NEW YORK**

This is our latest—a **Real** light weight; 344½ lbs. and delivers 36 h.p. at 1000r.p.m. If interested will send our catalog



Bore 4½ In., Stroke 4 In.

Watertown Motor Company
Watertown, N. Y.

DID YOU EVER HEAR OF AN OIL ENGINE?

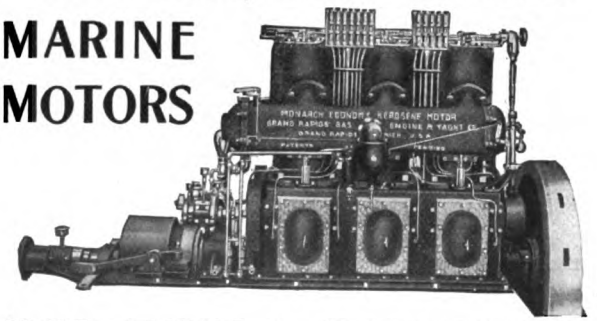
Did you ever hear that they would fill your cabin with a stench?
Did you ever hear that they were not reliable?
Did you ever hear that they stuck up with carbon?
Did you ever hear that Kerosene was just as dangerous as gasolene?
Would you like to know the truth on the above matters?
If you would, ask the **REMINGTON OIL ENGINE COMPANY of STAMFORD, CONN.,** and incidentally ask for their Catalog No. 10.

A. L. Abbott, Western Sales Agent, 1315 Chemical Building, Olive & 8th Streets, St. Louis, Mo.

MONARCH

Paraffine, Petrol or Kerosene, also Gasolene

MARINE MOTORS



60 H.P. at 325 R.P.M. Pilot House Controlled
Four-Cycle Type 5 to 160 H.P. Four Sizes

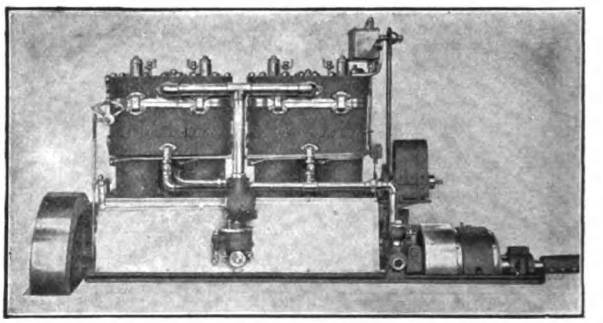
Reliability and durability secured by slow speed, perfect lubrication, large bearing surfaces, and moving parts.

Ask for Bulletins G and K

RESPONSIBLE SALES AGENTS WANTED

Grand Rapids Gas. Engine & Yacht Co.
100 FRONT STREET **GRAND RAPIDS, MICH.**

The 20th Century



2, 3, 4 and 6 Cylinders **10 H.P. to 300 H.P.**

Marine Gasolene Engine

means just what the name implies. It is the engine of the 20th century. Some of the many advantages are

Neatness of Design, Ease of Operation, Simplicity of Construction, Absence of Vibration and Noises, Economy of Fuel, Moderate Revolutions and Ample Bore and Stroke

To sum up, the **20th CENTURY ENGINE** embodies all the latest improvements, together with a standard of construction that will take others years to equal.

MANUFACTURED SOLELY BY

THE NEW YORK YACHT, LAUNCH & ENGINE CO.
Morris Heights, New York

Builders of Yachts, Launches and Business Boats of all descriptions.
High-class Workmanship a Specialty
Design and Construction Unsurpassed—Joiner Work Unequaled
Prices Phenomenally Low
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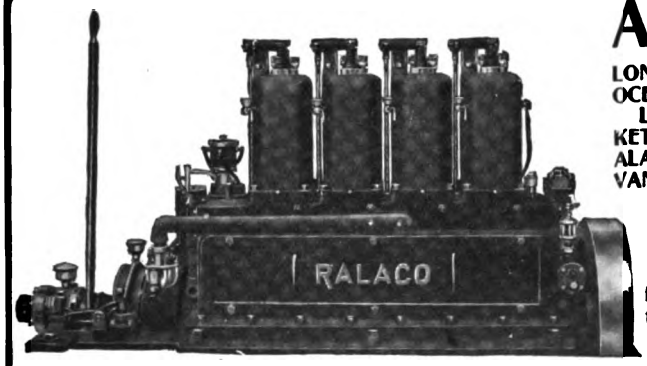

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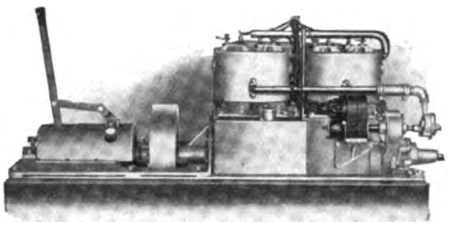

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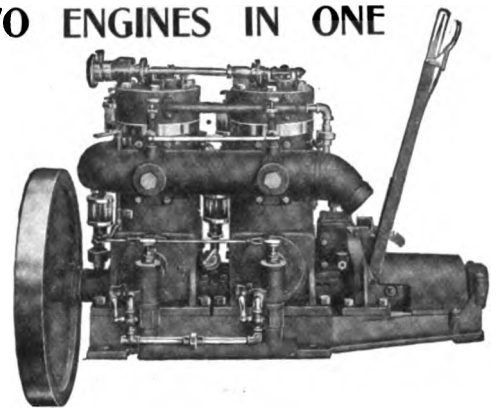

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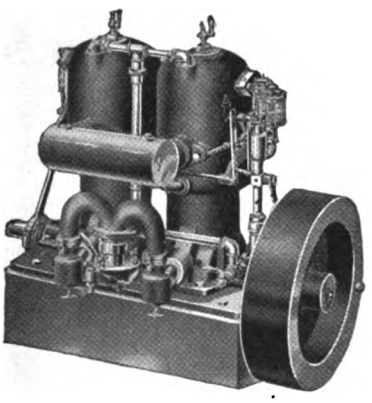

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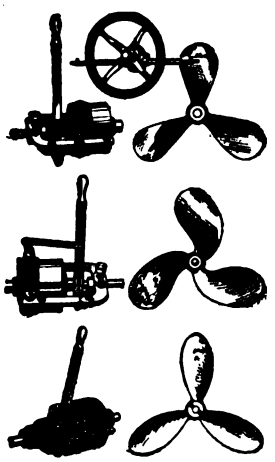

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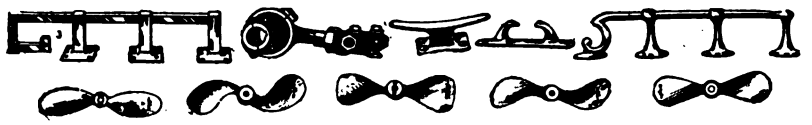

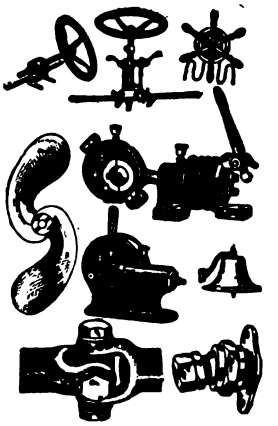

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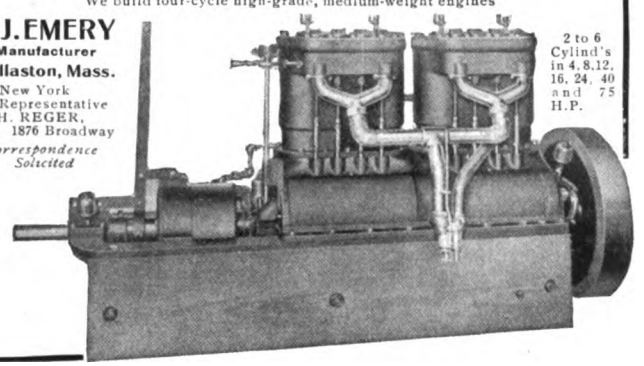

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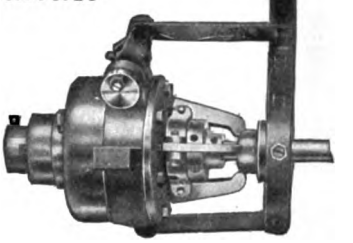

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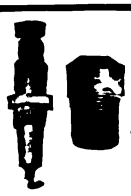

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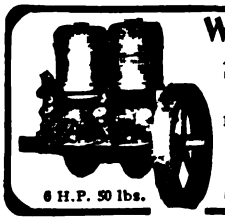

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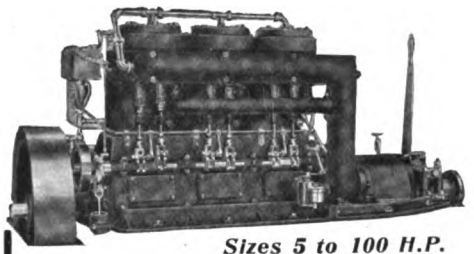

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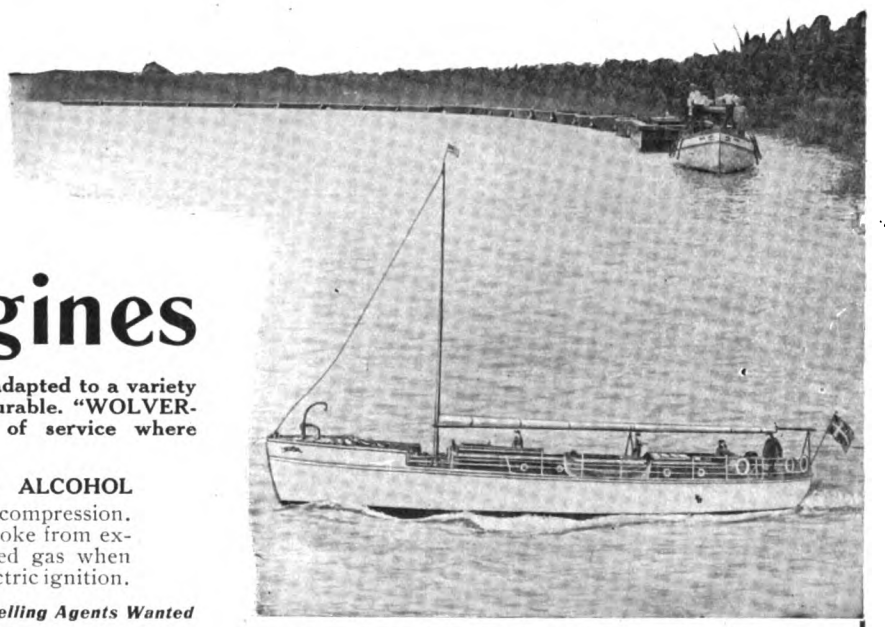

Upper cut shows towboat "San-San" with 27-H.P. "Wolverine" Engine, towing 19 Banana Lighters against a three-mile current at Panama
Lower cut shows Danish seagoing power cruiser "Selene," 80 ft. O. A., 36-H.P. "Wolverine" Engine

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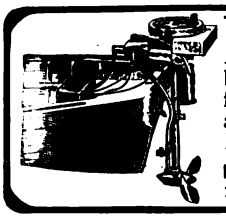

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Attached instantly to Flat or Round bottom boat. Can be carried by hand for taking on train, etc. Over 7 miles an hour. Not affected by waves or spray, Runs through weeds.

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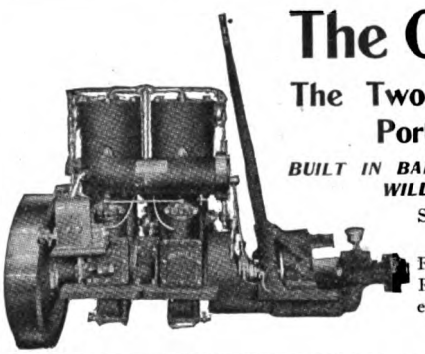

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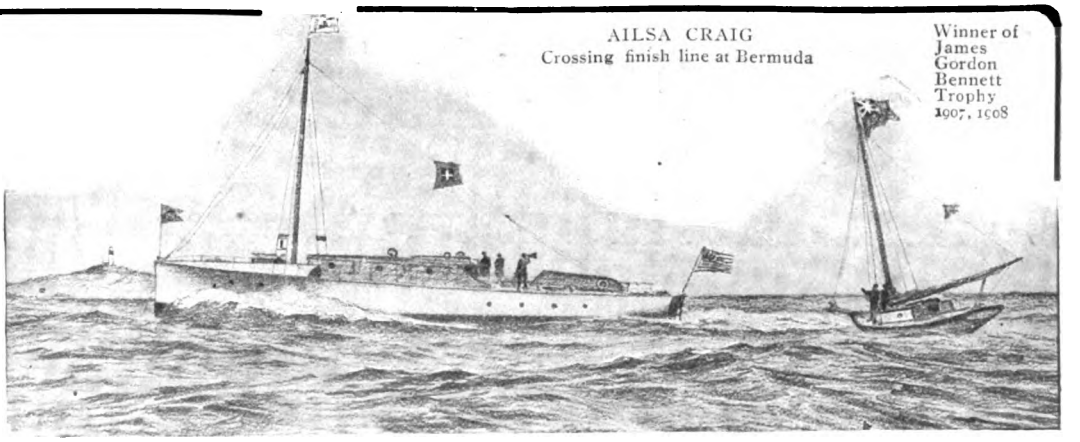

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MARINE ENGINES

A New "Six"

¶ We have determined to produce an addition to our already wide range of twenty-two models, in the shape of a six-cylinder speed engine of the Auto-Marine type. It will be ready for early spring delivery. The design and construction features of the new six have been thoroughly proven in the 1910 success of our 4-cylinder 25-h.p. Auto-Marine. Except for minor refinements in the design the new six-cylinder Auto-Marine will practically be the present 25-h.p. Auto-Marine with two added cylinders.

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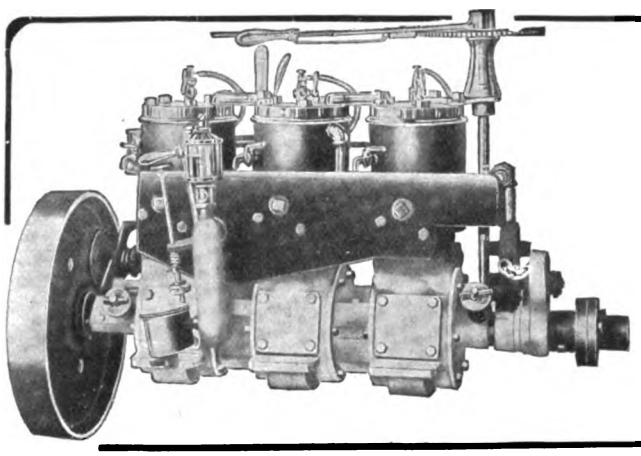

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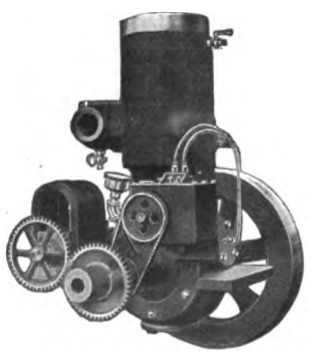

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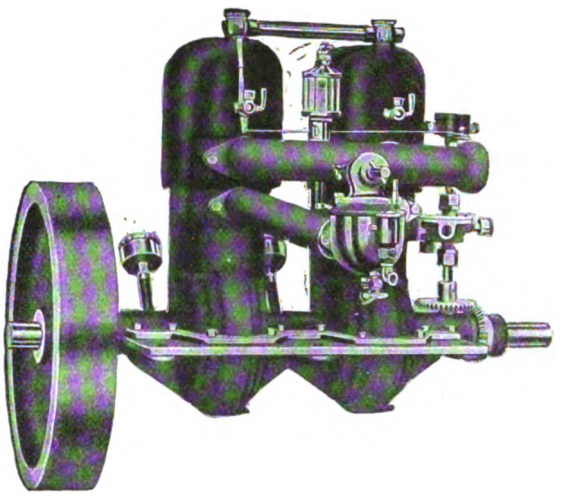

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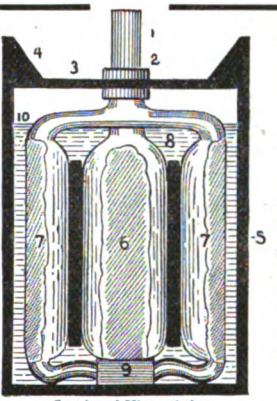

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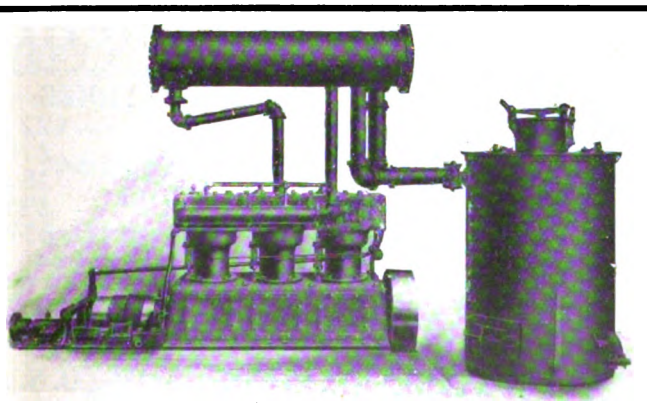

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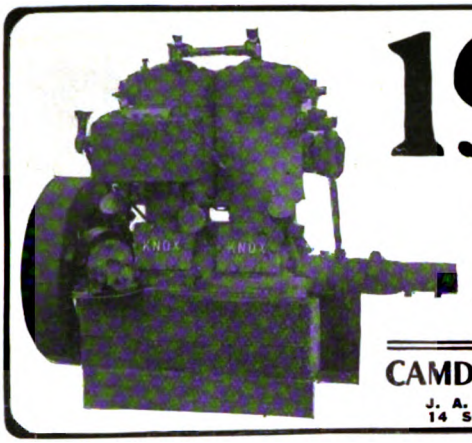

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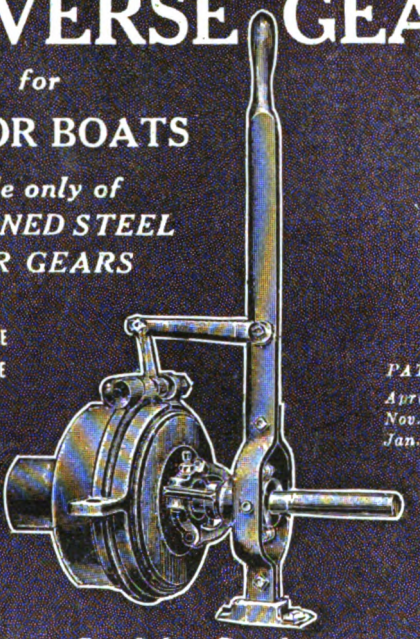

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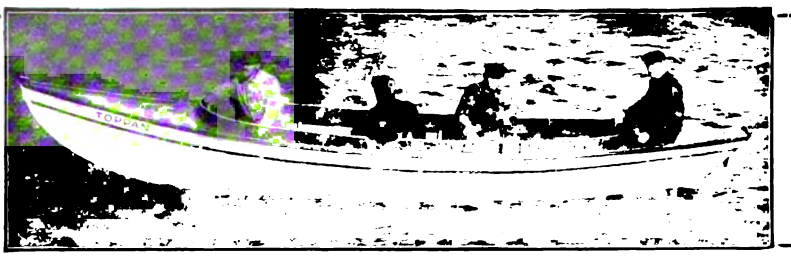

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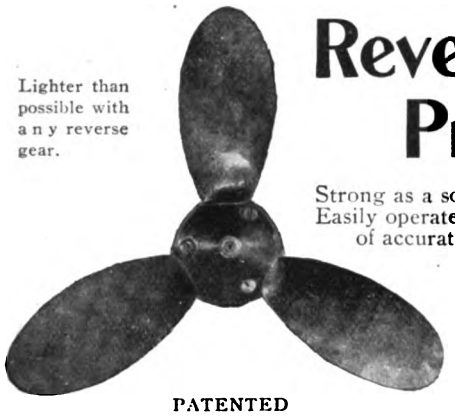

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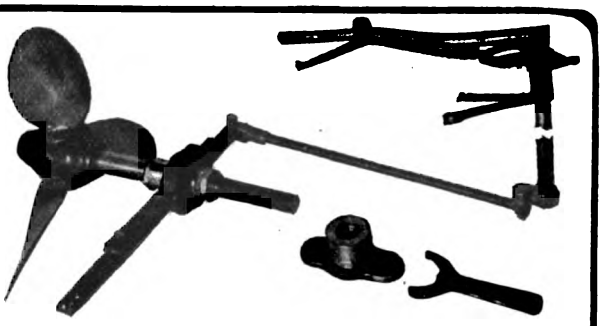

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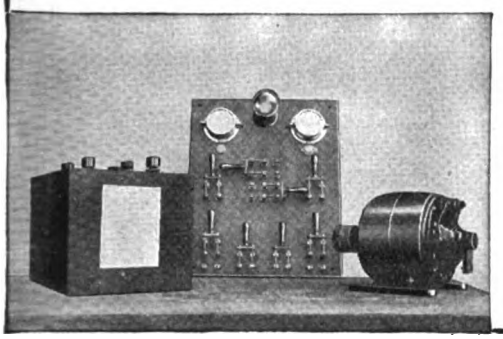

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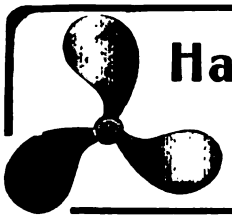

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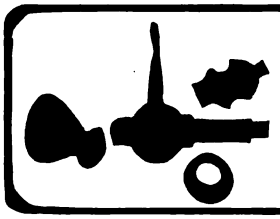

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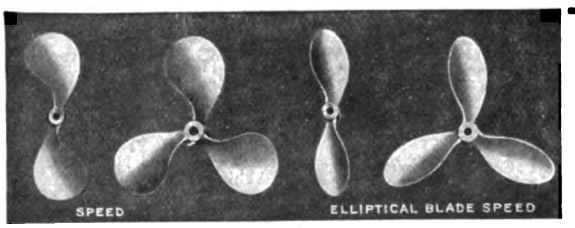

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Red Border

All letters and packages sent to Stations must be fully prepaid, and the Captains of the Stations will not be responsible for anything entrusted to their care, excepting so far as to take charge of it and protect it from damage and make sure of delivery to the right person. Packages and letters should be addressed care of the Station Captain, giving his name and address.

Station Captains whose names are followed by P. are pilots, and can be engaged to take yachts through the waters upon which their stations are situated.

The stations that are established are in good localities, and will undoubtedly prove useful to our cruising readers. As fast as we can we will establish others. Those who are willing to aid us by establishing a station will oblige by sending in their names. Size of RUDDER Flag for yachts, 2x2 ft., the center square being 1x1 ft.; the station flag is 4x4 ft., center, 2x2 ft.

EASTERN SEABOARD

STATION	CAPTAIN AND POST OFFICE ADDRESS
Albany, N. Y. (Gasolene)	Albany Yacht Club, Albany, N. Y.
Amityville, L. I. (Gasolene)	John E. Oliver, P., Amityville, N. Y.
Annapolis, Md. (Gasolene)	Walter Clark, Annapolis, Md.
Astoria, Pot Bay, L. I.	C. A. Wassmann, Astoria, N. Y.
Atlantic City, N. J. (Gasolene)	C. T. Ford, P., Atlantic City, N. J.
Augusta, Me. (Gasolene)	W. J. Skeehan & Co., Augusta, Me.
Baltimore, Md. (Gasolene)	Nilson Yacht Bldg. Co., Ferry Bar, Balt.
Bar Harbor, Me. (Gasolene)	Conners Bros., Bar Harbor, Me.
Bar Harbor, Me. (Gasolene)	Dirigo Boating Co., Bar Harbor, Me.
Barnstable, Mass	Vaughan D. Bacon, Barnstable, Mass.
Bath, Me. (Gasolene)	Bath Marine Construction Co., Bath, Me.
Bayonne, N. J.	G. Nelson, Ft. W. 24th St., Bayonne, N. J.
Bay Shore, L. I. (Gasolene)	Smith W. Weeks, Bay Shore, N. Y.
Beach Haven, N. J.	T. H. Sherborne, Beach Haven, N. J.
Beaufort, S. C. (Gasolene)	W. T. Wiggin, Beaufort, S. C.
Belfast, Me. (Gasolene)	Duplex Roller Bushing Co., Belfast, Me.
Biloxi, Miss. (Gasolene)	G. G. Westcott, Biloxi, Miss.
Boca Grande, Fla. (Gasolene)	W. L. Lonergan, P., Boca Grande, Fla.
Boston, Mass.	Wilson & Silsby, Rowe's Wharf, Boston.
Bradentown, Fla. (Gasolene)	Robt. H. Roesch, P., Bradentown, Fla.
Bridgeport, Conn. (Gasolene)	Bridgeport Motor Co., Bridgeport, Conn.
Brooklin, Me. (Gasolene)	E. M. Sherman, Brooklin, Me.
Buffalo, N. Y.	C. J. Sterling, Reading Wharf, Buffalo.
Cambridge, Md.	Geo. R. Navy, Cambridge, Md.
Camden, Me. (Gasolene)	Camden Anchor-Rockland Machine Co.
Campobello, N. B.	H. M. Merriman, Campobello, N. B.
Canarsie, L. I. (Gasolene)	W. A. Hale, Canarsie, N. Y.
Carrabelle, Fla. (Gasolene)	C. T. Wathen, Carrabelle, Fla.
City Island, N. Y. (Gasolene)	Robert Jacob, City Island, N. Y.
Cocoa, Fla. (Gasolene)	S. F. Travis & Co., Cocoa, Fla.
College Point, L. I. (Gasolene)	Knickerbocker Y. C., College Pt., N. Y.
College Point, L. I.	Geo. L. Stelz, College Point, N. Y.
Cottage City, Mass. (Gasolene)	Charles Joy, Cottage City, Mass.
Crescent Beach, Conn.	F. K. Partric, Crescent Beach, Conn.
Croton-on-Hudson, N. Y. (Gas.)	C. H. Osborn, Croton-on-Hudson, N. Y.
Delaware City, Del. (Gasolene)	Wm. U. Reybold, Delaware City, Del.
Duck Island Light, Conn. (Gas.)	Capt. Jos. Smith, P., Westbrook, Conn.
East Greenwich, R. I. (Gas.)	Fred. S. Nock, East Greenwich, R. I.
East Moriches, L. I.	Jacob Miller, East Moriches, N. Y.
Eastport, Me. (Gasolene)	S. L. Wadsworth & Son, Eastport, Me.
Essington, Pa. (Gasolene)	J. S. Sheppard, Essington, Pa.
Fair Haven, N. J. (Gasolene)	Fair Haven L.&B. Wks., Fair Haven, N.J.
Fall River, Mass.	C. P. McClellan, Rodman's Wh'f, Fall R'r.
Falmouth Heights, Mass. (Gas.)	C. L. Hopson, Falmouth Heights, Mass.
Forked River, N. J.	A. H. Grant, Forked River, N. J.
Fort Myers, Fla. (Gasolene)	Evans & Co., Fort Myers, Fla.
Fort Pierce, Fla. (Gasolene)	R. R. Gladwin, Fort Pierce, Fla.
Georgetown, S. C.	Kaminski Hardw'e Co., Georgetown, S. C.
Green Island, N. Y.	Shenandoah Y. C., Green Island, N. Y.
Greenport, L. I. (Gasolene)	W. W. Griffin, Rd. Whf., Greenport, N. Y.
Halesite, L. I. (Gasolene)	Atkin-Wheeler Co., Halesite, L. I.
Hampton Roads, Va. (Gasolene)	Hampton Rds. Y. C., Box 865, Norf'k, Va.
Hampton, Va.	Virginia Yacht Club, Hampton, Va.
Hudson, N. Y. (Gasolene)	Chas. P. Hermance, Hudson, N. Y.
Island Heights, N. J.	Wm. P. Rote, P., Island Heights, N. J.
Jamaica Bay, L. I.	E. C. Wood, Oceanus, N. Y.
Juneau, Alaska	J. A. Magrath, Juneau, Alaska.
Kennebunkport, Me. (Gasolene)	D. H. Heckman, Kennebunkport, Me.
Keyport, N. J. (Gasolene)	T. S. R. Brown Co., Keyport, N. J.
Lubec, Me	Chas. E. Hall, P., Lubec, Me.
Manhasset Bay, L. I. (Gasolene)	Manhasset Bay Y. C., Pt. Wash'n, N. Y.
Manteo, N. C. (Gasolene)	G. W. Tolley, Manteo, N. C.
Marblehead, Mass. (Gasolene)	Stearns & McKay, Marblehead, Mass.
Mariner Harbor, S. I.	Alexander Macdonald, Mariner Harbor
Marshallberg, N. C. (Gasolene)	Sam. Rose, P., Marshallberg, N. C.
Martha's Vineyard, Mass.	L. Norton, Edgar'n Y. C., Edgar'n, Mass.
Mattituck, L. I. (Gasolene)	Harvey Duryee, P., Mattituck, N. Y.
Maurice River, N. J. (Gasolene)	J. M. Garrison, P., Maurice River, N. J.
Melbourne, Fla. (Gasolene)	S. M. Martin, P., Melbourne, Fla.
Miami, Fla. (Gasolene)	M. R. Kullum, Miami, Fla.
Middletown, Conn. (Gasolene)	Middletown Y. C., Middletown, Conn.
Morris Cove, Conn. (Gasolene)	Hotel Shoreham, New Haven, Conn.
Nantucket, Mass.	Dr. Benj. Sharp, Nantucket, Mass.
New Bedford, Mass. (Gasolene)	Briggs & Beckman, New Bedford, Mass.
New Castle, Del. (Gasolene)	Wm. H. Beebe, New Castle, Del.
New Harbor, Me. (Gasolene)	S. Tibbitts, New Harbor, Me.
New York, N. Y.	Rudder Pub. Co., 1 Hudson Street, N. Y.
Newburgh, N. Y.	S. C. Ougheltree, Newburgh, N. Y.
Newburyport, Mass. (Gasolene)	American Y. C., Newburyport, Mass.
New London, Conn. (Gasolene)	Marine Iron Works, New London, Conn.
Newport, R. I. (Gasolene)	Newport Engine Works, Newport, R. I.
Newport News, Va. (Gasolene)	Hampton Roads Boat Co., Ft. 36th St.
Noank, Conn. (Gasolene)	Fred. I. Rathbun, Noank, Conn.
North Haven, Me. (Gasolene)	James O. Brown, North Haven, Me.
North Weymouth, Mass.	Tony S. Veader, North Weymouth, Mass.
Norwalk, Conn. (Gasolene)	Norwalk Y. C., Norwalk, Conn.
Nyack, N. Y. (Gasolene)	Julius Peterson, Nyack, N. Y.
Ocean City, N. J. (Gasolene)	Herbert C. Smith, Ocean City, N. J.
Ocracoke, N. C. (Gasolene)	H. S. Doxsee, Ocracoke, N. C.
Oxford, Md.	R. H. Tull, P., Oxford, Md.
Palatka, Fla. (Gasolene)	H. M. de Montmullin, Palatka, Fla.
Palm Beach, Fla. (Gasolene)	Geo. E. Andrews, Palm Beach, Fla.
Pawtuxet, R. I.	Richardson M. S. Co., Pawtuxet, R. I.
Port Bolivar, Tex.	Fred Shuman, Bolivar Point Light House
Port Jefferson, L. I.	R. N. Wilson, Port Jefferson, N. Y.
Portland, Me. (Gasolene)	G. D. Thorndike, 29 Portland Pier.
Portsmouth, N. H. (Gasolene)	Robt. R. Lear, P., Portsmouth, N. H.
Providence, R. I.	Paul B. Warren, Providence, R. I.
Red Bank, N. J. (Gasolene)	Chas. P. Irwin, Red Bank, N. J.
Rockaway Beach, L. I. (Gas.)	A. D. Francis, Rockaway Beach, N. Y.
Rockaway Beach, L. I.	Rockaway Motor Co., Rockaway Beach.
Rockland, Me.	G. D. Thorndike, Rockland, Me.
Roslyn, L. I. (Gasolene)	Thomas Clapham, Roslyn, N. Y
Round Pond, Me. (Gasolene)	I. E. Nichols, Round Pond, Me
Salem, Mass. (Gasolene)	W. G. Remon, Salem, Mass.
Salem, N. J.	Wm. H. Harris, Salem, N. J.
Savannah, Ga. (Gasolene)	Sav. Y. L. & Eng. Co., Savannah, Ga.
Sewaren, N. J. (Gasolene)	R. O. Acker, Sewaren, N. J.
Sharptown, Md.	Sharptown Yt. Bldg.Co., Sharptown, Md.
Shelton, Conn.	John A. Thomas, Shelton, Conn.
Solomon, Md. (Gasolene)	M. M. Davis, Solomon, Md.
Sorrento, Me.	P. L. Aiken, Sorrento, Me.
South Duxbury, Mass. (Gas.)	Merritt Ferrell, South Duxbury, Mass.
South Essex, Mass.	Wm. E. Hall, P., South Essex, Mass.
South Freeport, Me. (Gasolene)	L. A. Dixon, P., South Freeport, Me.
Southport, N. C.	J. B. Ruark, Southport, N. C.
St. Augustine, Fla. (Gasolene)	G. W. Corbett, St. Augustine, Fla.
St. Francis, Fla. (Gasolene)	John E. Harris, St. Francis, Fla.
St. John, N. B.	Geo. E. Holder, St. John, N. B., Can.
St. Michaels, Md. (Gasolene)	John W. Covington, St. Michaels, Md.
Stonington, Conn. (Gasolene)	Wm. P. Bindloss, Stonington, Conn.
Stuart, Fla. (Gasolene)	Stanley Kitching, P., Stuart, Fla.
Tampa, Fla. (Gasolene)	C. E. Douglas, 142 W. 10th Ave., Tampa.
Tampa, Fla. (Gasolene)	Florida Gas Eng. & Supply Co., Tampa.
Tarrytown, N. Y.	Tarrytown Yacht Club, Tarrytown, N. Y.
Thimble Islands, Conn. (Gas.)	Leo. Spitzer, Stony Creek, Conn.
Thunderbolt, Ga. (Gasolene)	W. M. Kidwell, Thunderbolt, Ga.
Titusville, Fla. (Gasolene)	M. L. von Koppelow, Titusville, Fla.
Titusville, Fla.	Wm. F. Green, Titusville, Fla.
Tottenville, S. I. (Gasolene)	Bentley Y. C., Tottenville, S. I.
Trenton, N. J. (Gasolene)	Trenton Y. C., Trenton, N. J.
Walton, Fla	W. H. Harris, Walton, Fla.
Wanchese, N. C.	E. R. Daniels, Wanchese, N. C.
Washington, D. C. (Gasolene)	Corinthian Y. C., Washington, D. C.
Watervleit, N. Y.	D. F. La Belle, Watervleit, N. Y.
West Mystic, Conn. (Gasolene)	Auto Boat Co., West Mystic, Conn.
West Mystic, Conn. (Gasolene)	T. A. McCreery, West Mystic, Conn.
Wethersfield, Conn	T. W. Hannum, Wethersfield, Conn.
Wilmington, N. C. (Gasolene)	C. D. Maffitt, 105 N. Water St., Wilmin'n,
Wiscasset, Me. (Gasolene)	F. F. Pendleton, Wiscasset, Me.

INLAND WATERS

Burlington, Vt. (Gasolene)	Lake Champlain Y. C., Burlington, Vt.
Charlevoix, Mich. (Gasolene)	R. A. Ranger, Charlevoix, Mich.
Chaumont, N. Y. (Gasolene)	Crescent Y. C., Chaumont, N. Y.
Cincinnati, Ohio	R. D. Gates, 502 W. 9th St., Cincinnati, O.
Duluth, Minn. (Gasolene)	W. B. Taylor, Duluth, Minn.
Geneva, N. Y. (Gasolene)	Fay & Bowen Engine Co., Geneva, N. Y.
Greenville, Mich.	C. T. Wright Eng. Co., Greenville, Mich.
Harbor Springs, Mich. (Gas.)	John Lamb, Harbor Springs, Mich.
Isle La Motte, Vt.	W. Carrol Twombley, Isle La Motte, Vt.
Isle Royale, Mich.	W. H. Singer, Isle Royale, Mich.
Ithaca, N. Y. (Gasolene)	Motor & Mfg. Co., Ithaca, N. Y.
Ithaca, N. Y.	Wm. Jarvis, Ithaca, N. Y.
Lake Champlain, N. Y. (Gas.)	I. C. Stafford, Essex, N. Y.
Lake Champlain, N. Y. (Gas.)	H. P. Smith, Westport, N. Y.
Lake Memphremagog, Vt. (Gas.)	G. H. Newland, Eagle Point, Vt.
Lake View House, Vt. (Gas.)	W. J. Samson, Lake View House, Vt.
Little Current, Ont. (Gasolene)	Byron H. Turner, Water St. Wharf, Ont.
Mackinac Island, Mich. (Gas.)	N. J. Murdick, Mackinac Island, Mich.
Manistee, Mich	H. L. Harley, Manistee, Mich.
Menasha, Wis. (Gasolene)	Brighton Boat & Supplies Co., Menasha.
Muskegon, Mich.	King Fold. Can. Bt. Co., Muskegon, Mich.
Newport, Vt. (Gasolene)	C. H. Newland, Newport, Vt.
Oneida Lake, N. Y.	Hotel St. Charles, Sylvan Beach, N. Y.
Oswego, N. Y. (Gasolene)	John S. Parsons, Oswego, N. Y.
Peoria, Ill. (Gasolene)	Central Motor Boat Co., Peoria, Ill.
Plattsburg, N. Y. (Gasolene)	Dock & Coal Co., Plattsburg, N. Y.
Portage Lake, Mich.	Oulkama Sail. Club, Portage Lake, Mich.
Port Huron, Mich.	Liscom Bros., Port Huron, Mich.
Rondeau Harbor, Ont. (Gas.)	W. R. Fellows, Jr., P., Blenheim, Ont.
Sault Ste. Marie, Mich. (Gas.)	Kibby & Shields, Sault Ste. Marie, Mich.
Seneca Lake, N. Y.	F. B. Weller, Watkins, N. Y.
South Haven, Mich.	L. W. Newbre, South Haven, Mich.
Syracuse, N. Y. (Gasolene)	Severe Dorion, 8 Malcolm Blk., Syracuse.
Union Springs, N. Y. (Gasolene)	J. F. Woodworth, Union Springs, N. Y.
Whitehall, N. Y. (Gasolene)	E. P. Manville, Whitehall, N. Y.

WESTERN SEABOARD

Avalon, Cal.	L. D. Baker, Catalina Isle, Cal.
Eagle Harbor, Wash.	Nugent & De Chanaud, Winslow, Wash.
Eureka, Cal.	H. Lund, Eureka, Cal.
Los Angeles, Cal.	W. J. Reeve, Los Angeles, Cal.
Marshfield, Ore. (Gasolene)	Coos Bay Oil & Supply Co., Marshfield
Portland, Ore.	Oregon Yacht Club, Portland, Ore.
San Francisco, Cal.	Lewis Q. Haven, 75 Beale St., San Fran.
San Pedro, Cal.	C. D. Callahan, San Pedro, Cal.
Tacoma, Wash. (Gasolene)	A. Foss, Foss Boathouse, Tacoma, Wash.
Tacoma, Wash. (Gasolene)	A. Foss, Foss' Salm. Bch., Tacoma, Wash.
Terminal, Cal. (Gasolene)	Joseph Fellows, Terminal, Cal.
Vancouver, B. C.	Chas. O. Julian, Vancouver, B. C., Can.

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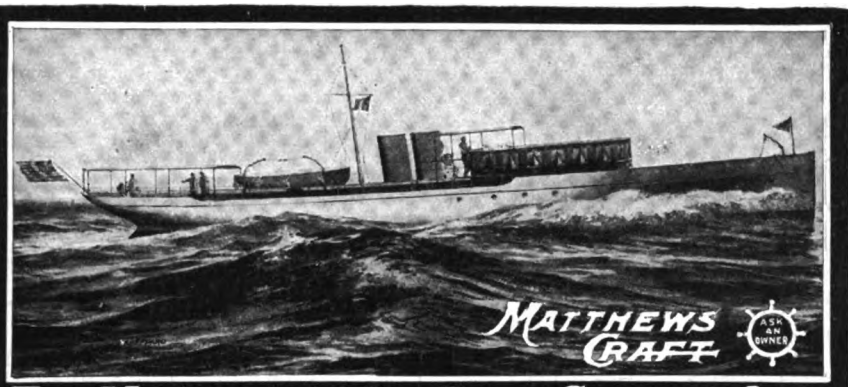

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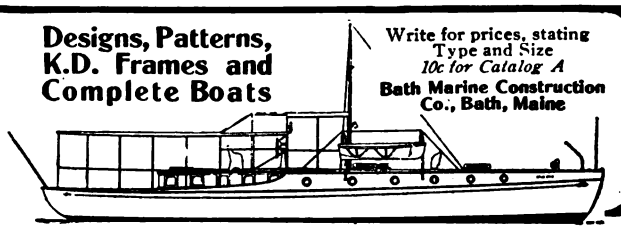

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NAVAL ARCHITECTS' MEETING

The proper armament for battleships was a lively topic yesterday at the eighteenth annual meeting of the Society of Naval Architects and Marine Engineers in the Engineering Societies' Building, 28 West Thirty-ninth Street.

The discussion arose over a paper by Sir William White, the well-known English naval architect. Sir William was not present and his paper was read by Assistant Secretary Cox.

The paper said that it is agreed generally that future naval actions will be fought at longer ranges than in the past, but as to the probable fighting range there are two opinions. One asserts that an extremely long range will be maintained by commanders whose fleets possess greater speed and whose ships are armed on the big-gun principle. It is urged that this will put ships armed with fewer big guns and secondary armaments at a disadvantage, because the secondary armaments will be of no practical service at very long range.

The other opinion asserts that although actions may be begun at long ranges under average conditions, when the intention is to carry the fight to a decisive finish closer ranges will be reached. Consequently this school thinks it desirable to associate with the big guns a powerful secondary armament of quick firing guns. The advocates of secondary armament have noted many vulnerable points in the modern battleship which might be attacked effectively by the quick firing guns of the secondary armament within their range.

The other school, however, expecting longer ranges, does not think the injuries to be produced by the fire of the smaller guns, which are less accurate at long ranges, would be serious or extensive.

Reasoning from the existing information based upon "battle practice" at long ranges, Sir William reached conclusions in favor of secondary batteries. He says:

"Even at long ranges the secondary armaments of battleships will be capable of delivering a hail of fire against an enemy and of exercising an important influence upon the result of an action."

In discussing the calibers and positions for the guns and the maximum number of heavy guns that should be carried by a battleship, Sir William says:

"In no case is it desirable to carry more than eight heavy guns in a single ship. These guns are best arranged in four positions as in the Michigan class, and they should be supplemented by a powerful and well-protected secondary armament. All the reasons given for preferring the 13.5-inch caliber to the 12-inch would apply also to still larger guns, and it may happen that before the tide turns larger calibers than 14-inch will be mounted just as was done thirty years ago. But the turn will doubtless come in due course."

In the discussion that followed the reading of the paper Rear-Admirals Mahan and Capps expressed their full agreement with the views of the English expert. Prof. William Hovgaard of the Massachusetts Institute of Technology dissented in part, favoring twelve big guns instead of eight. He spoke of the need of heavier armament below the water line for protection against submarine attacks. J. H. Linnard, Naval Constructor, U. S. N., thought Sir William's paper a protest against the present tendency to over-emphasize armament and neglect strengthening the armor in battleships.

Jacob W. Miller read a paper on the Cape Cod ship canal. He went into the history and economic importance of foreign canals from the time of Babylon down. He told of the antebellum canal-building period in this country and said that although the introduction of steam checked the development of our water courses, the time has now arrived when water transportation will find its own again. He said the Cape Cod canal will be finished in 1912. The total length to thirty-foot water at each end and across the isthmus will be ten miles, eight of which will be land-digging. The depth is to be 25 feet and the minimum bottom will be 100 feet. The total excavation amounts to 17,000,000 cubic yards.

Continuing, Mr. Miller said:

'The tonnage through Vineyard Haven Sound to-day, which will be all tributary to the canal, amounts to 25,000,000 a year, of which there is: coal, 9,000,000 tons; stone, 300,000 tons; Nova Scotia plaster, 250,000 tons; oil, 200,000 tons; high-class merchandise, 2,000,000 tons; the remainder being crude material of various descriptions.

"The number of passengers between New York, Southern and Eastern points by water to-day is over 500,000 a year. This amount will be greatly increased through the opening of the canal, as the neighboring regions will be much more accessible and steamers of the Sound type can leave New York late in the evening, land their passengers at desirable resorts, and arrive at Boston early the next morning. The New Haven railroad runs along the southern bank of the canal. A large manufacturing center will be developed at the eastern end, where mills will have the advantage of both land and sea transportation. Water abounds in the hills back of the center of the line, and on these hills an increasing summer population will undoubtedly be settled.

"Scepticism as to the success of the canal has been natural, being based on the conditions of the past, where the great majority of the coastwise tonnage was carried in sailing vessels. To-day this tonnage is under the control of a small number of corporations, which tow the merchandise in barges. Insurance from perils of the sea will be lessened by the canal. Humanity demands the elimination of the dangerous, stormy and fogbound route around the Cape."

In speaking of the freight to be carried Mr. Miller said:

"Cheap freight is vital to the Eastern States, for in no other way can the population of a manufacturing region in a locality devoid of cotton, iron or coal continue its industries. If New England is to continue her prosperity she must continually foster water transportation. Massachusetts especially should be alive to the fact that while Government bureaus are publishing reports and associations are discussing future policies, actual work is being done by a corporation within her borders upon the channel and that the Cape Cod Canal will be finished in 1912."

Charles H. Cramp spoke on the evolution of screw propulsion in the United States. The meeting will continue to-day and in the evening there will be a dinner at the Waldorf.

* * *

A FAST LACKAWANNA

25 miles an hour made in the bay by speed boat Lance, fitted with 27-H. P. Lackawanna Engine Auxiliary Inlet Valves. Over a measured mile course on the Newburgh side of the river the speed boat Lance, built by Heinrichs Bros., Baldwin, L. I., made the phenominal speed of 25 miles an hour. F. G. Hall, Gen. Mgr. and Geo. Sewards, Mechanician, of the Lackawanna Mfg. Co., operated Lance, which is 24 feet 6 inches long by 3 feet 6 inches beam. The boat, which is purely a racing machine, has a wedged-shaped hull, and was brought round from Great South Bay through 25 miles of open ocean to participate in the races of the New York Motor Boat Club on Sept. 23. Like many other of the fast boats, it was damaged by driftwood off 165th St., and was withdrawn. It was afterward run up to Jerome's boat yard at the foot of Washinton St. and repaired. The engine, a 27-H. P. 4-cylinder, Lackawanna, has been fitted with auxiliary inlet valves and twin carbureters, thus resulting in increased power and speed.

* * *

GASOLENE ENGINES ON THE MISSISSIPPI

The steamboat Alice, the only steam packet engaged in the lower coast service, was retired yesterday on account of lack of patronage. Her entrance was an experiment, the the first since the Grover Cleveland retired more than a year ago. The business is almost entirely monopolized by the little gasoline craft who carry light freights and make frequent trips. Capt. Warren Kouns was master of the Alice and Capt. Comeaux was her agent. Capt. Kouns yesterday expressed his gratitude to those patrons who remained loyal to his packet during its unequal struggle for business. The boat that finally discounted the Alice was the Paul, 125 ft. in length, 6 ft. draught and 25 ft. beam. Equipped with a 100-H. P. Wolverine, a 3-cylinder engine with 12½ bore and 14-inch stroke. This engine is one of the most efficient and economical engines in operation, and a wonderful success in various ports of this country and South America.

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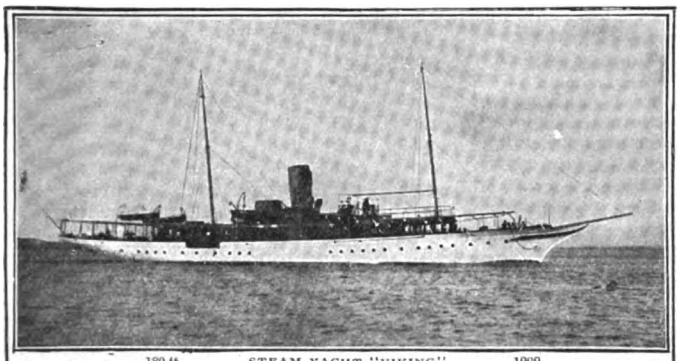

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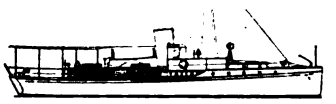

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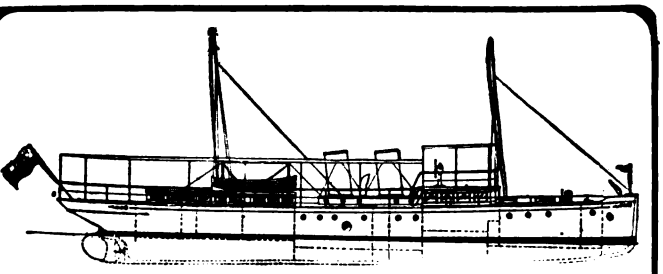

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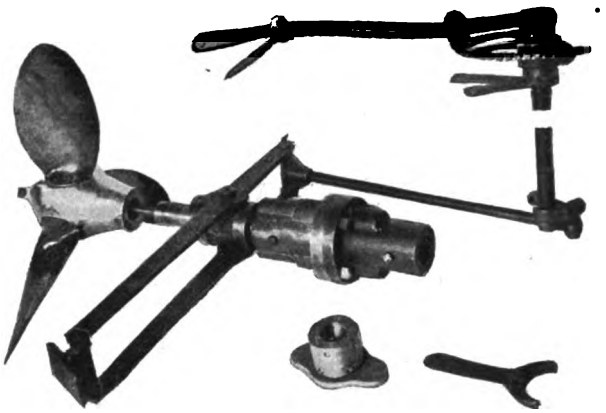
LEIGHTON REVERSIBLE WHEEL

The illustration shows a Leighton (Hollow-Shaft style) type of wheel, which is suitable for engines developing 12 H. P. and up to a 100 H. P. at 1000 revolutions.

The Leighton wheel was used on three winners of the American Power Boat Association Gold Challenge Cup, also on Chip III, which has a record of 30 miles in 58 minutes, 19 seconds, and many other fast boats.



The Wheel also has been very successfully used on commercial boats.

Perfect control of the boat is obtained by a slight variation in the pitch. This changeable pitch enables you to get the best possible speed out of your engine at all speed.

This wheel is made by H. J. Leighton of Syracuse, N. Y., and is without a doubt the most successful reversible wheel on the market. * * *

NEW YORK AGENCY FOR HALL ENGINE

The Hall Gas Engine Company of Philadelphia, Pa., recently opened an agency in New York City, at 50 Church St., in charge of John Sillen, who has gained an enviable reputation as engineer in long-distance ocean racing. The experience gained in the long-distance Bermuda, Havana and many other deep-sea races by the Hall Company is embodied in a new design which they are bringing out for large engines.

This engine has been designed for a real get-at-able engine; secondly, it has been worked out mechanically so that each part can be seen in operation, and many of the parts removed and inspected while engine is running, something that has never been accomplished before.

This design is built in four and six cylinders only, the six-cylinder being self-starting and reversing, and will be used for either gasoline, kerosene or producer gas.

The cylinders are cast in pairs with separate heads over each cylinder, and separate caps over each valve.

Lubdication is supplied by mechanical force-feed pump oilers to all bearings; the oil is used until worn out. After it is fed to bearings it runs into base where it is pumped to an oil filter, when it is filtered and cooled; from filter it runs into supply tank, which is piped direct to the multiple feed-pump oilers; consumption is about one kuart every ten hours running.

Experience, where an engine runs for six to seven days, such as in the Havana race, has demonstrated that theh mechanical oiler is the only thing for the large gasolene engines.

One pump supplies water to two cylinders only, which makes the water circulation doubly sure, there being two water pumps for the four-cylinder and three for the six-cylinder engines.

All the valves are on one side of engine operated by the cam-shaft, which also operates the ignitors and air controlling device. Each valve-lifting device has an air cushion lift which makes this mechanism noiseless.

On opposite side of engine is the shaft which drives the water-cooling pumps, bilge pump, air pump, which are all vertical, packing nuts up and magneto.

The base of engine which holds the crank-shaft is water jacketed under crank-shaft bearings; this means cool bearings at all times whether engine is run an hour or a week.

Each bearing is fitted with wedge and screw adjustment, all bearings being of bronze.

Large oil shields cover crank-shaft so that it will not throw oil; these oil shields are clamped in place and can be removed in five seconds.

The one aim in designing this engine has been to produce a quiet, smoothrunning, substantial machine, which at the same time will produce great power for the bore and stroke. * * *

KNOCKDOWN BOATS

The C. T. Wright Engine Company of Greenville, Michigan, are offering their new 1911 boat plans, that are as up-to-date and as near perfect as it is possible to make a set of stock plans.

They commissioned a well-known naval architect to work out their line, and he has succeeded in giving them a very valuable and complete line. Their line is very extensive, and as all boats have been carefully worked out and tested, they are bound to give unusual satisfaction.

The Company is building very extensively, and this enables them to make a very attractive price of the knockdown form or complete hull and equipment.

* * *

Mr. Clayton Von Culin, formerly with the Ferro Machine and Foundry Company, and who during the past year has been manager of the New York office of the Lackawanna Manufacturing Company, and Mr. Wilbur H. Young, formerly General Agent for the Lackawanna Manufacturing Company, New York Branch, have organized the Gasoline Engine Equipment Company, and have leased two entire floors at No. 133 Liberty Street, New York City. One floor, which is on the street level and is provided with show windows, is devoted entirely to the purpose of exhibiting marine and stationary gas and gasoline engines and equipment, including boat-builders' supplies. The other floor is used for the storage of a full line of engines and accessory parts.

Engines of both two and four-cycle types, heavy-duty, slow-speed, medium and light-weight, medium and high-speed, from two to one-hundred-and-fifty horse-power, operating on gas, gasoline, kerosene, alcohol or distillate, for marine and stationary purposes, are carried in stock. By having in stock the above complete line of engines, the Gasoline Engine Equipment Company will enable the intending purchaser to secure a power plant that is exactly adapted to his particular requirements, whether for marine, stationary, electric lighting, pumping or farm and traction purposes.

A special department has been organized to furnish inquirers with correct information regarding the size, type, speed, weights, etc., of engines and all kinds of equipment which may be required for either boats or stationary plants.

Arrangements have been completed with the Columbian Brass Foundry, manufacturers of the celebrated Columbian propellers, for opening the New York branch of that Company, where at all times a complete stock of propellers will be kept on hand, for the convenience of both the public and the trade. Similar arrangements have been completed with the Electric Goods Manufacturing Company for the well-known "Perfex" ignition specialties.

* * *

NEW YORK AGENT

The Michigan Wheel Company of Grand Rapids, Mich., have made arrangements with R. A. Corley, Room 510, 1123 Broadway, New York City, to become their Eastern Representative. Mr. Corley has been in the marine business for several years, and during this time has become familiar with all makes of propeller wheels and reverse gears, and finally settled on the Michigan line, and has accepted the agency of the famous Michigan Speed Wheels, Reverse gears noted for their strength, durability, ease of control, and their complete line of up-to-date Marine Hardware. It will be of interest to all Eastern engine and boat-builders and the consumers to order direct through R. A. Corley as he has a proposition to make to each and every one which will save them money.

* * *

CADY OF CANASTOTA

Cady Marine Engines, built by C. N. Cady Company of Canastota, N. Y., are offered to the public with a guarantee to make a satisfied customer of every user of Cady engines.

C. N. Cady, the designer and builder, is one of the pioneers of the gas engine trade, and his plan has always been to try and make the best engines, rather than the cheapest.

Having had considerable experience he decided on building engines in three sizes, 4, 8, 12 h.p., which enabled him to produce and perfect his machines, and build them in large quantitiies and sell at a price consistent with workmanship and material used.

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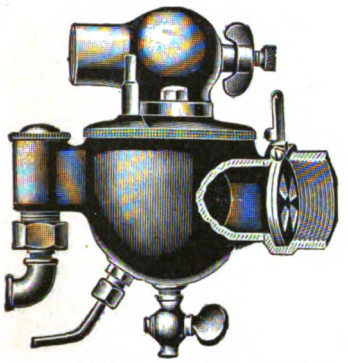
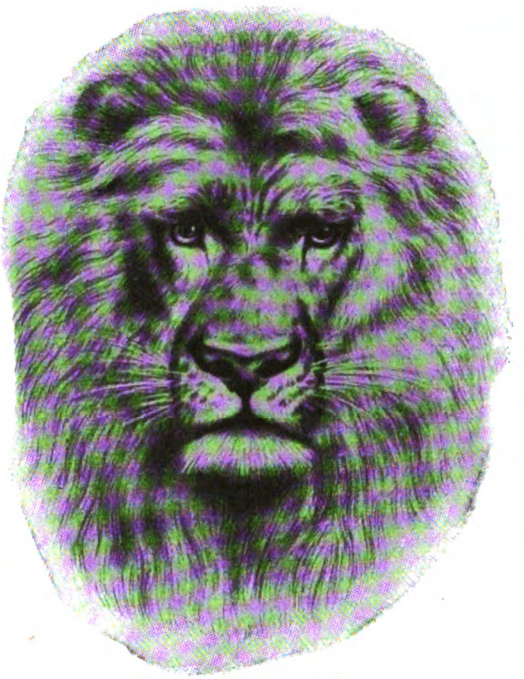
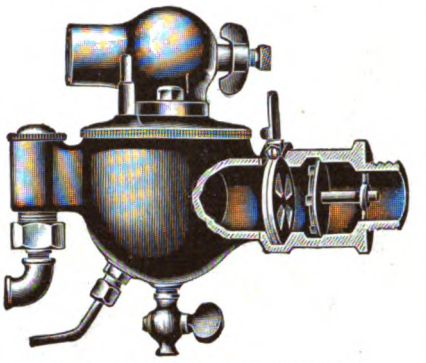
Monarch Carburetor



1910 MODEL G. Patent Pending

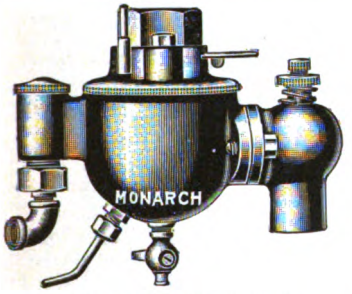
The 1910 Models of **Monarch Float-Feed Carburetors** show some decided improvements. They are made in two models, G and H. Model G is designed for three-port single and multiple-cylinder engines. Model H





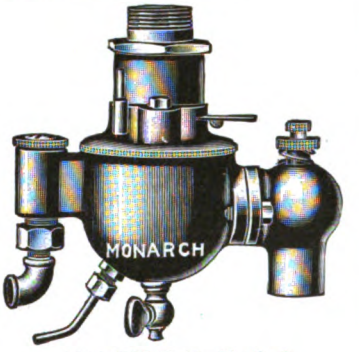
1910 MODEL H. Patent Pending

is designed for two-port motors. These carburetors are of correct design, and add to the efficiency of motors using them. They are fitted with a very practical and ingenious PATENTED DISC THROTTLE, interposed between the check and the carburetor.

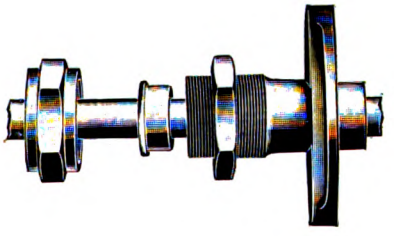


1910 MODEL G. Vertical
For Three-Port or Four-Stroke Engines

For 1910



1910 MODEL H. Vertical
With Check Valve Combination



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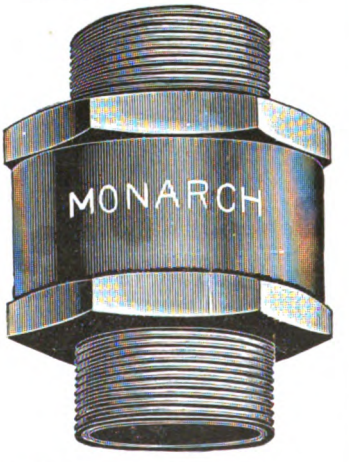
Auxiliary Air Port supplies a fresh charge of air to engine while running.



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THE MONARCH VALVE COMPANY

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A NEW ENGINE

The present season witnesses the introduction of an exceedingly interesting development of the gas engine. The Reynolds Motor Company, of Detroit, comes forward with a rotary valve motor, so simple in construction that it looks for all the world like a two-cycle. But it is not—it is a true four-cycle motor—and with the noise and wear of the poppet-valve mechanism eliminated.

A brief description of the main features will facilitate discussion.

The four cylinders of the 3½ in. x 4½ in. 15-20-H. P. model are cast en bloc, not only insuring a very compact motor, but permitting the use of a very short, stiff two-bearing crank-shaft. This latter has been designed with exceedingly large connecting rod and end bearings, to give long life under the hardest duty that could possibly be put on the motor. Crank-shafts and connecting rods are made from a special grade of drop forgings. Babbit-lined bronze bushings further insuring the utmost stability in the bearings, have been adopted in spite of their cost. Crank case, reverse gear case and cylinder head cover are in aluminum, with thick substantial walls. Ignition is by dual system, with battery and coil to start on, and imported high-tension magneto for running. So far, all is in compliance with standard practice. Now we come to the valve mechanism. The motor is operated by a series of four disc valves, each having a single port and a stem projecting upward through the casting into the upper gear case. The valves are seated in the heads of the cylinders, and as they rotate their ports register alternately with intake and exhaust passages in the cylinder casting. A vertical drive-shaft is geared to the crank-shaft and has on its upper end a small pinion. This pinion meshes with the first of a train of four spiral gears, each of which is keyed to the stem of one of the valves. All gears used are spirals, and the motion is of course continuous, there being absolutely no reciprocating parts in connection with the valve mechanism. This avoids the wear and consequent derangement common to the poppet-valve type. The construction also reduces noise and vibration to a minimum, and the motor improves in quietness and 'sweetness" with wear. Lubrication of the valves is positively obtained by means of a force-feed sight oiler; lubrication of connecting rods, pistons and piston pins, is by constant level circulating splash system.

A word about the evolution of the Reynolds type of rotary valve four-cycle motor:

Some five years ago its inventor conceived this idea, as a means of getting away from the disadvantages of poppet-valve construction. Several very small single-cylinder models were tried out with fair success. Some time later a number of large single-cylinder models were brought through, and with changes here and there it began to appear that something remarkable could be developed. Some two years ago a two-cylinder model was constructed, and after being tried out it was put to the task of running the small machine shop which was then the scene of operations. This motor was remarkably successful, and in fact was the sole source of power in the old shop for eighteen months, running constantly two hours per day, and driving twelve standard machine tools. During this time these motors came to the notice of some of the men interested at present. It was apparent that the idea had been brought to an entirely workable stage, although in details it still was very crude. It was decided to purchase the patents and to go ahead with the work of embodying this idea in a motor which would be thoroughly up to the best modern standards in every respect. To this end the Reynolds Motor Company was formed, and the work was undertaken by Messrs. Howard E. Coffin, Cecil H. Taylor and Guido G. Behn, all exceedingly well-known and recognized engineers. It seemed best to start with a small four-cylinder model, one which would cover the marked demand for a fairly light, compact motor of moderate power. A series of these motors has been brought through with 3½ inch bore and 4½ inch stroke, and under the most exhaustive tests have given wonderfully gratifying results. In addition to their all having been run out on the blocks under break load, one was put in the place of the old two-cylinder model, and run the shop for several months, one was installed in a very heavy dory, and was given many weeks of arduous duty, one was placed in the Company's demonstrative boat Whisper, and has been in very active operation on the river all summer, frequently being called on to run all day at top speed, and doing it without a miss; still another was fitted to a chassis, and has been doing remarkable work on the road for some time past.

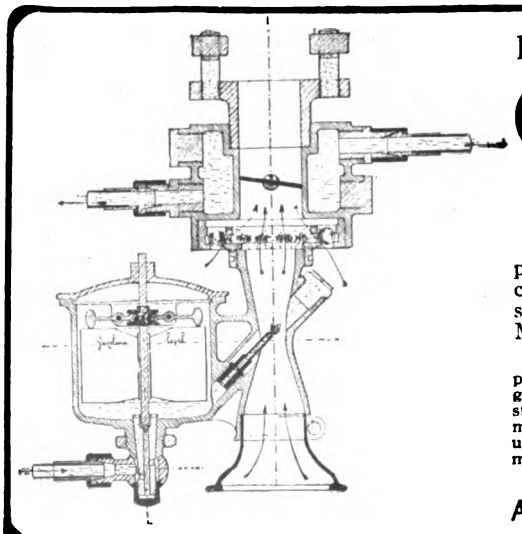
The Company is now manufacturing in its own new building, equipped with the finest machinery adapted to high-grade motor construction which can be purchased. The building, which has just been completed, is of white brick, concrete, steel and glass, and the conditions here are up to the very highest modern standards in every respect.

In the Company are: Pres., M. J. Murphy, Pres. Murphy Chair Co.; Pres. Security Trust Co.; Vice-Pres., Walter S. Russel, Pres. and Gen. Mgr. Russel Wheel & Fdry. Co.; Sec. and Treas., A. Macomb Campau, Vice-Pres. A. M. Campau Realty Co.; Howard E. Coffin, Vice-Pres. and Consulting Engineer Hudson Motor Car Co.; Cecil H. Taylor, Chief Engineer Hudson Motor Car Co.; Guido G. Behn, Executive Engineer Hudson Motor Car Co.; Herbert C. Sadler, Professor Naval Architecture, University of Michigan; George H. Cheney, Shop Manager, ex of Westinghouse Machine Co., Barber-Colman Co., etc.

* * *

MICHIGAN WHEELS

The past season has been a most successful one for the Michigan Wheel Co. A Rudder reader, Mr. Feney Andreas, who placed an order with them last spring, has written them a very strong testimonial letter. Fernandeiz & Co., of Hong Kong, through their advertisement in The Rudder, bought some reverse gears, and have written they have had unusual satisfaction; in fact the results far surpassed their expectation. The Michigan Wheel Co. are giving special attention to export business, which has increased enormously of recent years.



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G. & A.

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The Carburettor G. & A. is built on scientific principles. It is the product of famous French engineers who have spent years in experimenting and study to produce a carburettor that has no adjustments to make and that will perform all its functions under any conditions. The result of their experimenting and study is the Carburettor G. & A.

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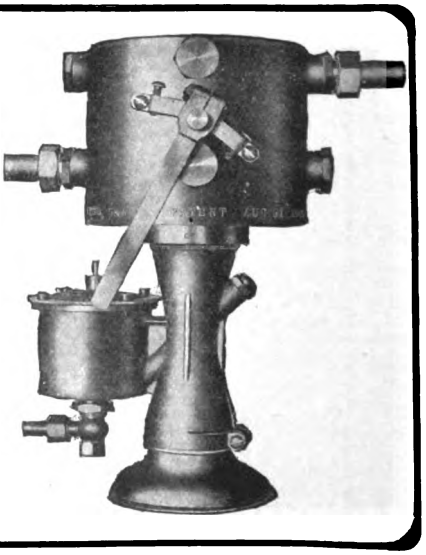

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ERECTED FRAMES

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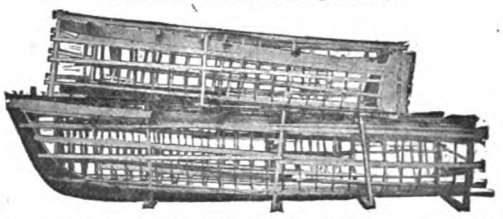

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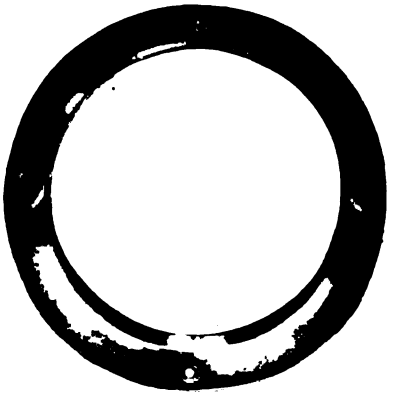

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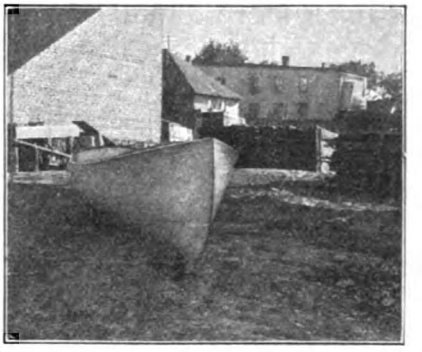

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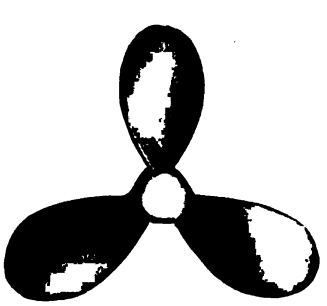

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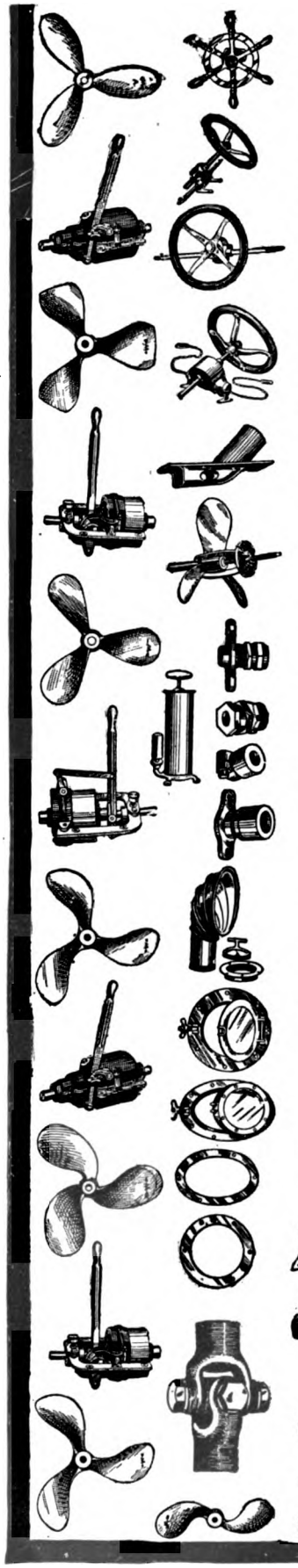

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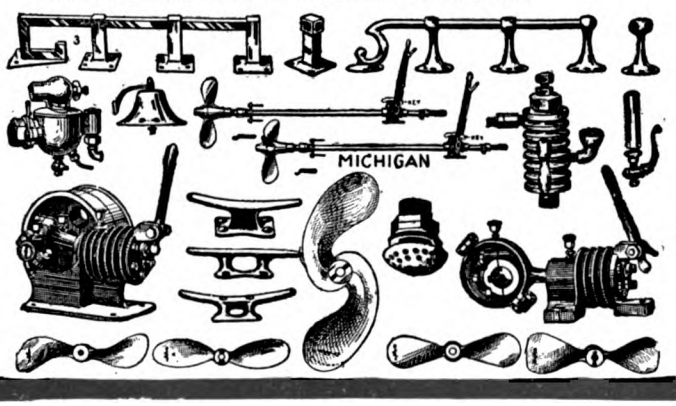

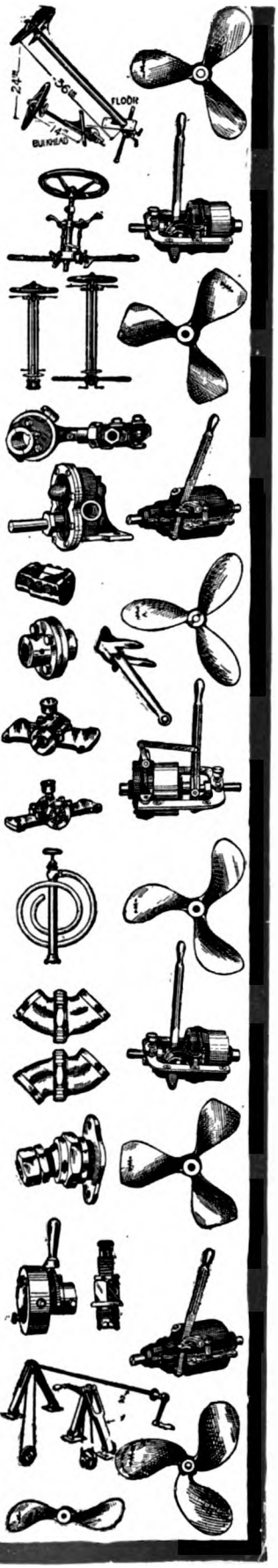

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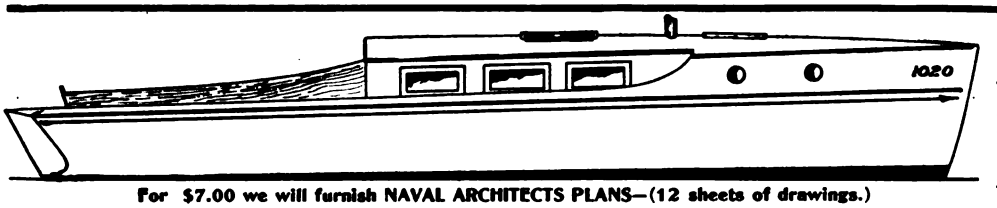

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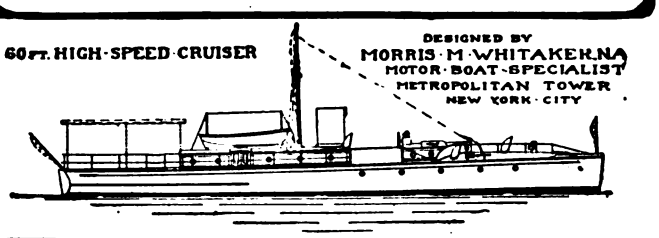

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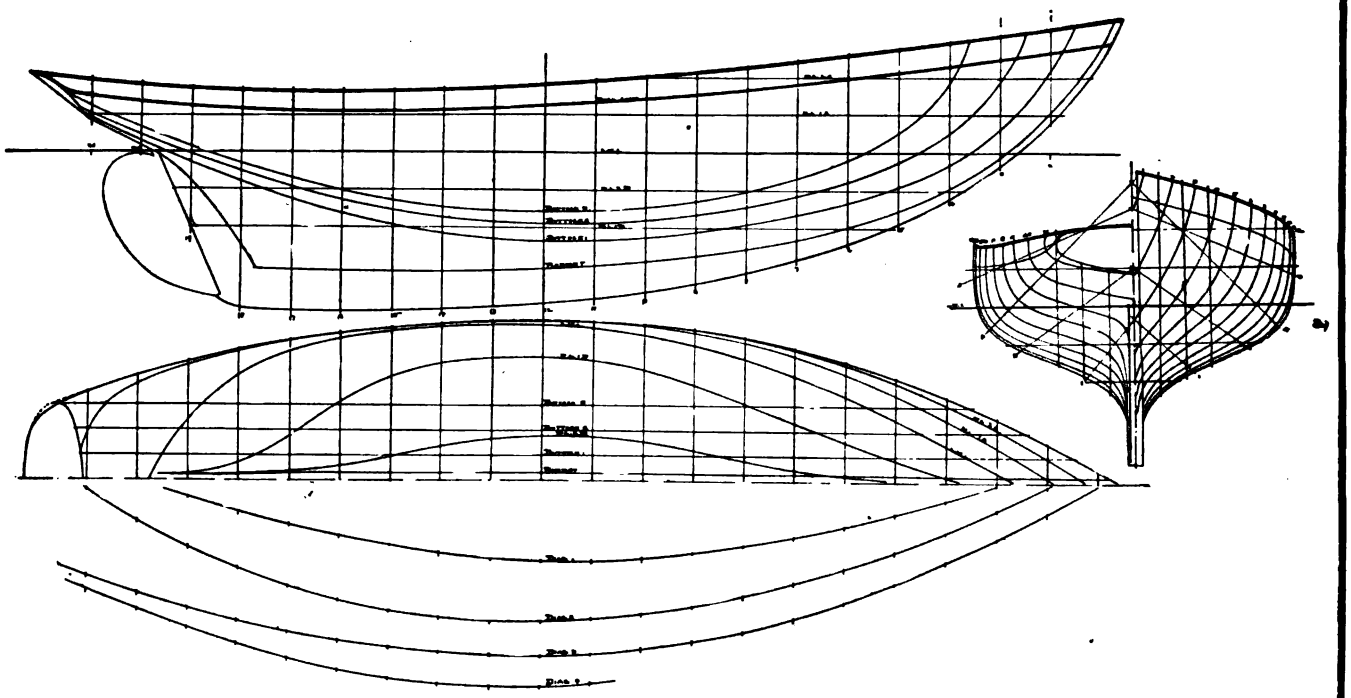

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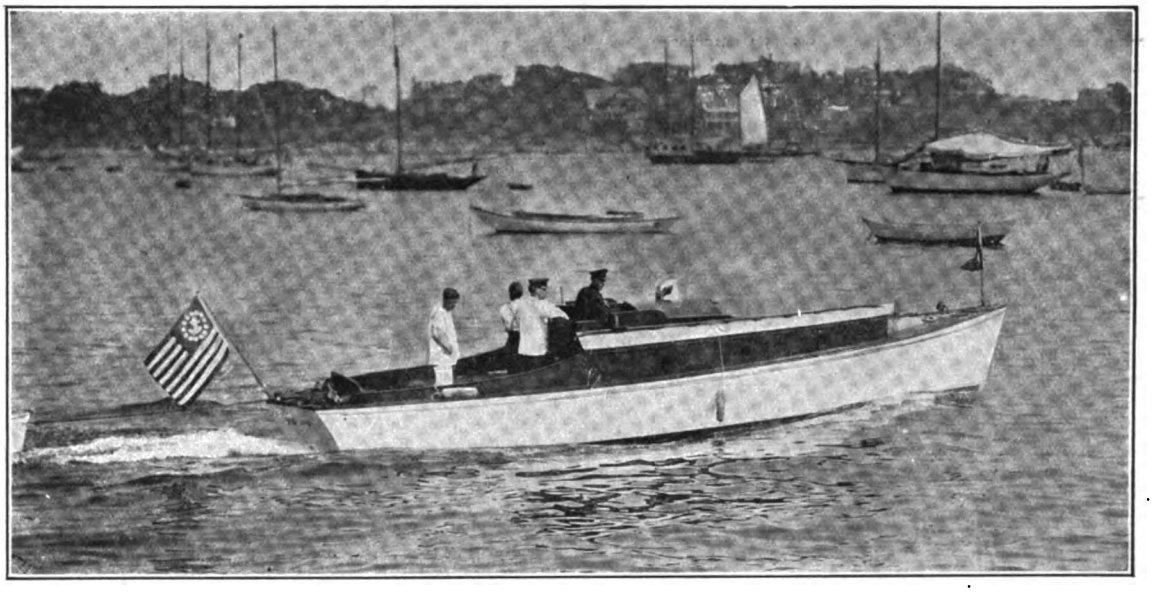

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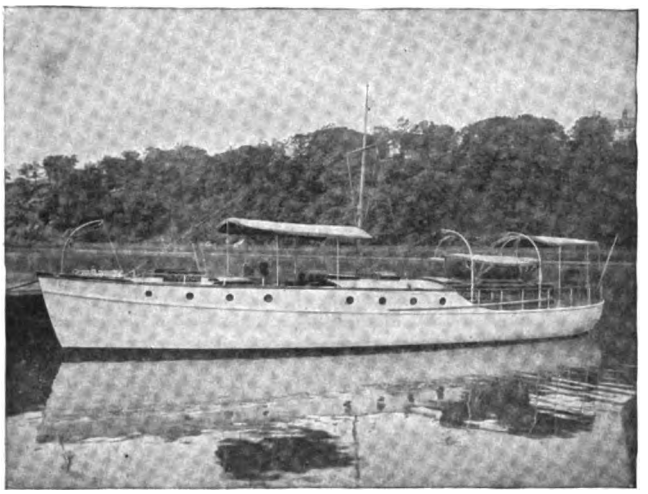

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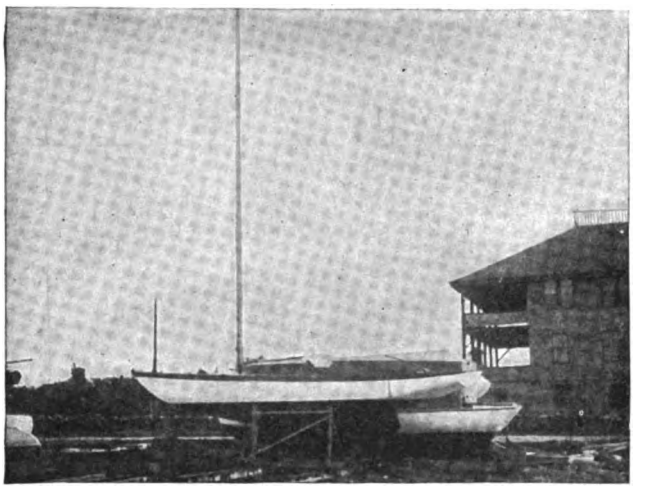

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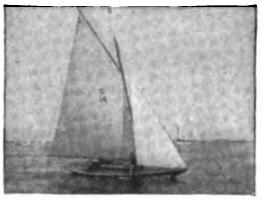

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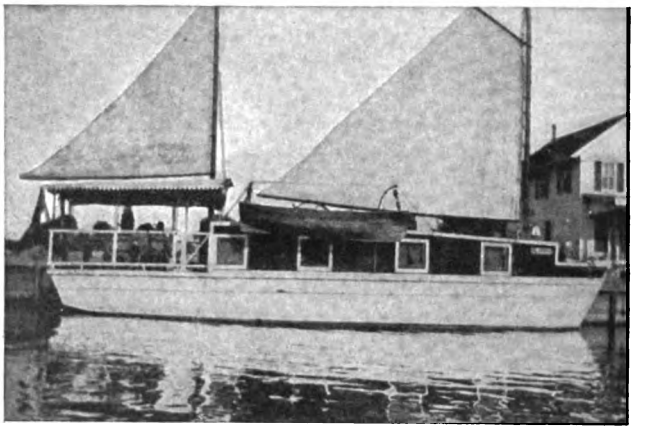

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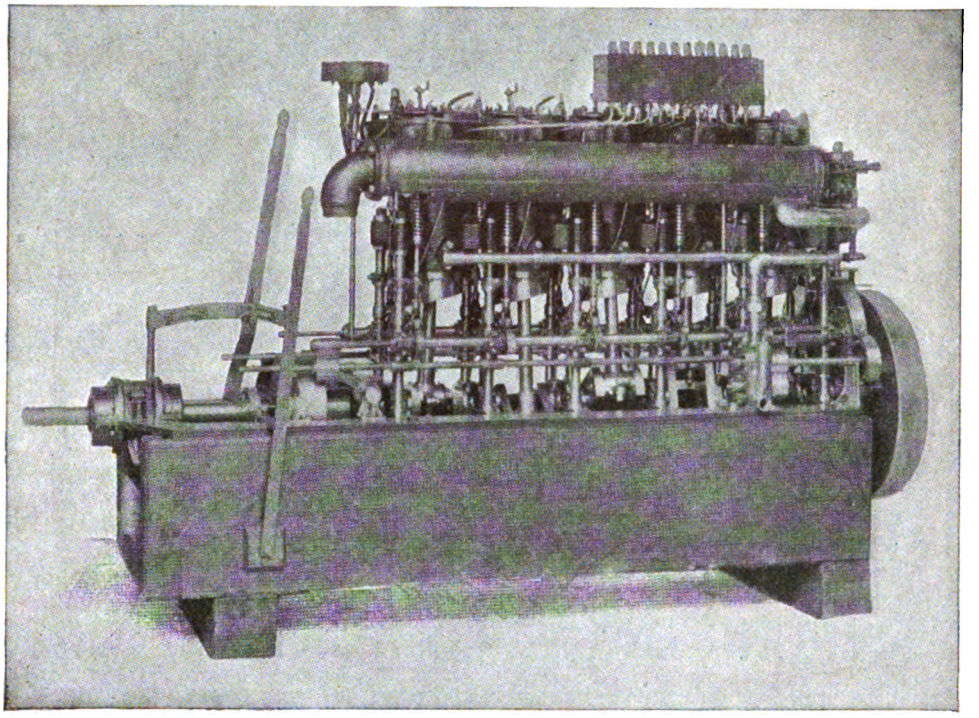

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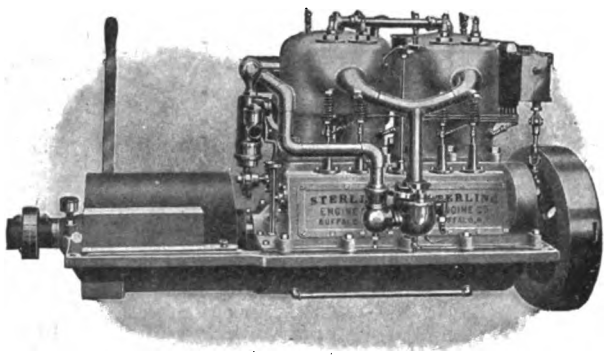

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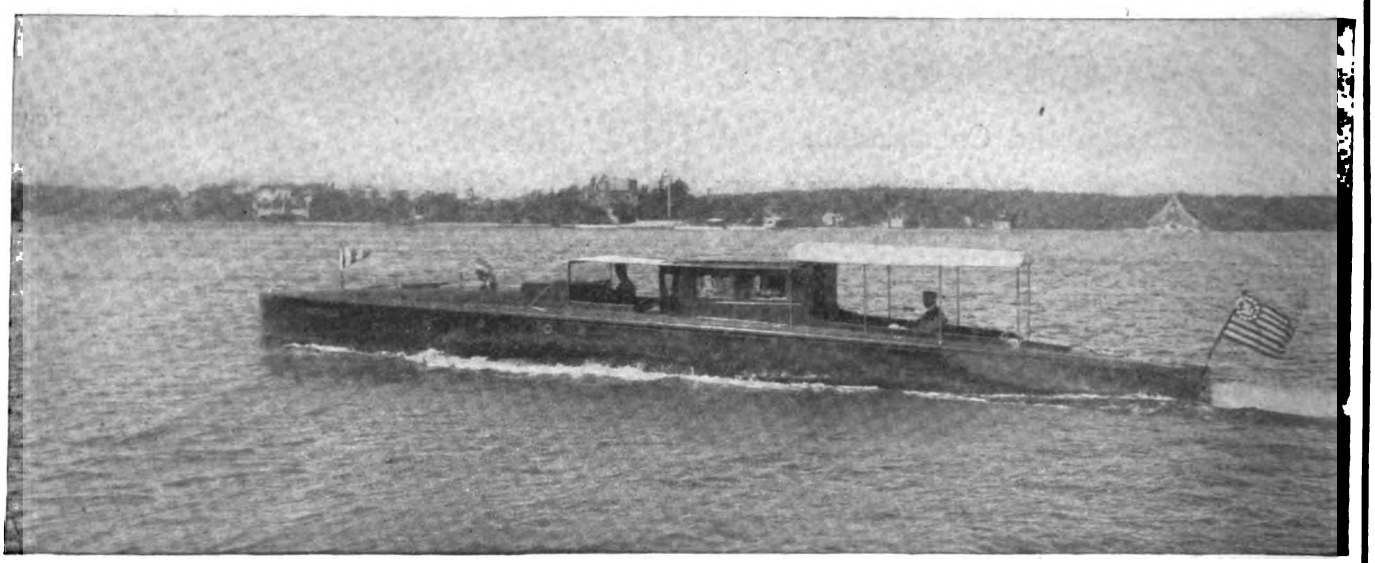

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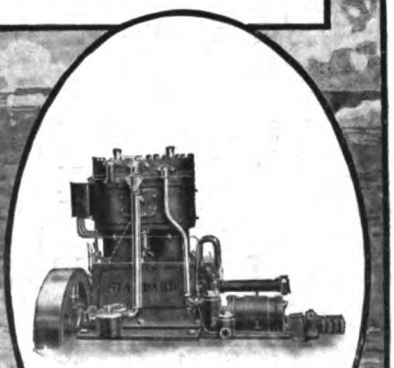

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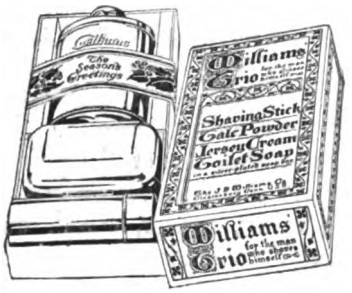

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